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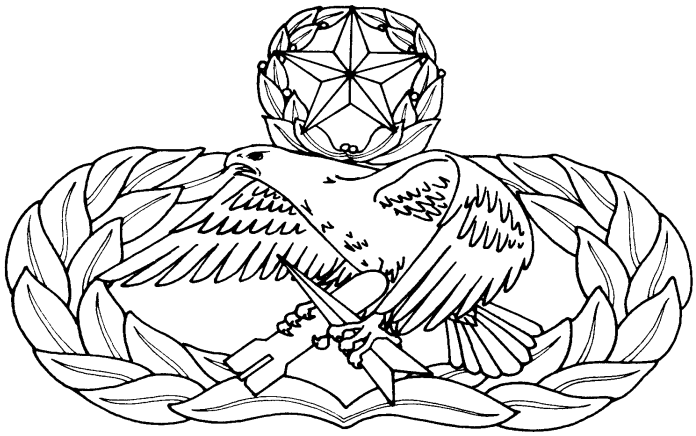
TELEPHONE SYSTEMS



CAREER FIELD EDUCATION AND TRAINING PLAN

TELEPHONE SYSTEMS
AFSC 2E6X3
CAREER FIELD EDUCATION AND TRAINING PLAN

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Part II

TELEPHONE SYSTEMS
AFSC 2E6X3
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Part I

Preface

1. Resource constraints in the Air Force are impacting the availability of our most valuable resource - manpower. This condition, which will continue to exist in the future, makes it essential for the workforce to be effectively and efficiently trained to perform duties within each skill level of an Air Force Specialty (AFS). In order for the Air Force to meet the challenges of tomorrow, a greater emphasis must be placed on career field training. This Telephone Systems Career Field Education and Training Plan (CFETP) is a management tool that will enable the Air Force and each MAJCOM to place the needed emphasis on total career field training. It provides the framework and guidance necessary to plan and develop a career field training program. The plan, which is a "training road map" for the career field, identifies mandatory and optional education training requirements. It includes initial skills, upgrade, and continuation training that individuals should receive during their career in this specialty.

2. The CFETP, which documents the career field training program, consists of two parts. Management uses both parts to plan, manage, and control training within the career field.

2.1. Part I, Section A provides the information necessary for overall management of training in the career field. It contains administrative details and explains the purpose and use of the CFETP. Section B provides a description of the specialty, suggests career field progression, provides career field information, documents training decisions, defines each skill level, and identifies MAJCOM continuation training options. Section C specifies qualification requirements for upgrade/progression in each subsequent skill level in the career field and provides a complete list of continuation training for the specialty. Sources of training, other than that provided by AETC, are also identified. Section D identifies known resource constraints.

2.2. Part II of the CFETP contains the Specialty Training Standard (STS) and identifies the various training sources and courses available to members of the specialty. The STS is comprised of the Course Training Standard (CTS) and the Career Training Guide (CTG). The CTS includes the tasks and knowledge requirements for award of the three skill level. The CTG includes the tasks and knowledge requirements for upgrade/progression in each subsequent skill level in the career field and identifies proficiency levels achieved in initial skills training and the Career Development Course (CDC). Supervisors and trainers at the unit level use Part I, Section C and Part II of the CFETP to identify, plan, and conduct unit level training commensurate with the overall goals of this plan.

3. Use of the guidance provided in this CFETP ensures individuals in this career field receive effective and efficient training at the appropriate points in their career. This plan will enable the Air Force to train today's workforce for tomorrow's jobs.

Abbreviations/Terms Explained

Provides a common understanding of the terms that apply to the Telephone Systems Career Field Education and Training Plan. Terms:

Advanced Training. A formal course of training that leads to a technical or supervisory level of an Air Force Specialty (AFS). Training is for selected airmen at the advanced level of an AFS.

Air Education and Training Command (AETC).

Air Force Job Qualification Standard (AFJQS). A comprehensive task list that describes a particular job type or duty position. Supervisors use the AFJQS to document task qualification. The tasks on AFJQSs are common to all persons serving in the described duty position.

Air Force Qualification Training Package (AFQTP). An instructional course designed for use at the unit. It may be printed, computer based, or other audiovisual media.

Career Field Education and Training Plan (CFETP). A comprehensive, multipurpose document, that encapsulates the entire spectrum of career field training. It outlines a logical growth plan that includes training resources and is designed to make career field training identifiable, eliminate duplication, and is budget defensible. 2EXXX CFETPs are posted at http://www.il.hq.af.mil/ilm/ilmm/cemaint/index.html.

Career Training Guide (CTG). A document that uses Task Modules (TM) in lieu of tasks to define performance and training requirements for a career field.

Continuation Training. Additional advanced training exceeding the minimum upgrade training requirements with emphasis on present or future duty assignments.

Core Task. A task Air Force Career Field Managers (AFCFM) identify as a minimum qualification requirement within an Air Force specialty or duty position.

Course Training Standard (CTS). A CTS is developed for all courses not governed by and STS, including specialized training packages and computer-based training courses.

Enlisted Specialty Training (EST). A mix of formal training (technical school) and informal training (on-the-job) to qualify and upgrade airman in each skill level of a specialty.

Exportable Training. Additional training via computer assisted, paper text, interactive video, or other necessary means to supplement training.

Initial Skills Training. A formal resident courses resulting in award of the 3-skill level.

Instructional System Development (ISD). A deliberate and orderly, but flexible process for planning, developing, implementing, and managing instructional systems. It ensures personnel are taught in a cost efficient way the knowledge, skills, and attitudes essential for successful job performance.

Major Command (MAJCOM).

Occupational Survey Report (OSR). A detailed report showing the results of an occupational survey of tasks performed within a particular AFS.

On-the-Job Training (OJT). Hands-on, over-the-shoulder training conducted to certify personnel in both upgrade (skill level award) and job qualification (duty position certification) training.

Qualification Training. Actual hands-on task performance based training designed to qualify airmen in a specific duty position. This training program occurs both during and after the upgrade training process. It is designed to provide the performance skills training required to do the job.

Resource constraints. Resource deficiencies, such as money facilities, time, manpower, and equipment, that preclude desired training from being delivered.

Skill Training. A formal course which results in the award of a skill level.

Specialty Training Package and COMSEC Qualification Training Package. A composite of lesson plans, test material, instructions, policy, doctrine, and procedures necessary to conduct training. These packages are prepared by AETC, approved by National Security Agency (NSA), and administered by qualified communications security (COMSEC) maintenance personnel.

Specialty Training Standard (STS). An Air Force publication that describes skills and knowledge that an airman in a particular Air Force specialty needs on the job. It further serves as a contract between AETC and the user to show the overall training requirements for an AFSC that the formal schools teach.

Standard. An exact value, a physical entity, or an abstract concept established an defined by authority, custom, or common consent to serve as a reference, model, or rule in measuring quantities or qualities, establishing practices or procedures, or evaluating results. A fixed quantity or quality.

Task Module (TM). A group of tasks performed within an Air Force specialty that are performed together and that require common knowledge, skills, and abilities. TMs are identified by an identification code and a statement.

Telephone Systems. Telephone switching equipment, telephone key equipment, telephone subsets, transmission equipment, and associated wiring/circuitry that provides telephonic voice communications and common user transmission media for C4 systems.

Total Force. All collective Air Force components (active, reserve, guard, and civilian elements) of the United States Air Force.

Training Capacity. The capability of a training setting to provide training on specified requirements, based on the availability of resources.

Training Impact Decision System (TIDES). A computer-based decision support technology designed to assist Air Force career field managers in making critical judgements relevant to what training should be provided personnel within career fields, when training should be provided (at what career points), and where training should be conducted (training setting).

Training Planning Team (TPT). Comprised of the same personnel as a U&TW however, TPTs are more intimately involved in training development and the range of issues is greater than in the U&TW forum.

Training Requirements Analysis (TRA). A detailed analysis of tasks for a particular AFS to be used in the training decision process.

Training Setting. The type of forum in which training is provided (formal resident school, on-the-job, field training, mobile training team, self-study, etc.).

Upgrade Training. Training which leads to the award of a higher skill level.

Utilization and Training Pattern. A depiction of the training provided to and the jobs performed by personnel throughout their tenure within a career field or Air Force specialty. There are two types of patterns: 1) Current pattern, which is based on the training provided to incumbents and the jobs to which they have

been and are assigned; 2) Alternate pattern, which considers proposed changes in manpower, personnel, and training policies.

Utilization and Training Workshop (U&TW). A forum of the Air Force Career Field Manager (AFCFM), MAJCOM Air Force Specialty Code (AFSC) career field managers, subject matter experts (SME), and AETC training personnel that determines career ladder training requirements.

Section A - General Information

1. Purpose of the CFETP. This CFETP provides the information necessary for career field managers, training management, supervisors, and trainers to plan, develop, manage, and conduct an effective and efficient career field training program. The plan outlines the training that individuals in AFSC 2E6X3 should receive in order to develop and progress throughout their career. For purposes of this plan, training is divided into three areas: initial skills, upgrade, and continuation training. Initial skills training is the AFS specific training an individual receives upon entry into the Air Force, normally conducted by AETC at one of the technical training centers. Upgrade training identifies the mandatory courses, task qualification requirements, and Career Development Course (CDC) completion required for award of the 5-, 7-, or 9-skill level. Continuation training is additional training provided to 3-, 5-, 7-, and 9-level personnel to increase their skills and knowledge beyond the minimum required for upgrade. The CFETP has several purposes, some of which are:

1.1. Serves as a management tool to plan, develop, manage, and conduct a career field training program. Also, it is used to ensure that established training is provided at the appropriate point in an individual's career.

1.2. Identifies task and knowledge training requirements for each skill level in the specialty and recommends training throughout each phase of an individual's career.

1.3. Lists training courses available in the specialty, identifies sources of the training, and provides the training medium.

1.4. Identifies major resource constraints that impact implementation of the desired career field training program.

2. Use of the CFETP. The CFETP is maintained by the Air Force Career Field Manager (AFCFM). MAJCOM Career Field Managers and AETC review the plan annually to ensure currency and accuracy and forward recommended changes to the AFCFM. Using the list of courses in Part II, they determine whether duplicate training exists and take steps to eliminate/prevent duplicate efforts. Career field training managers at all levels use the plan to ensure a comprehensive and cohesive training program is available for each individual in the career ladder.

2.1. AETC training personnel develop/revise formal resident and exportable training based upon requirements established by the users and documented in the STS. They also develop procurement and acquisition strategies for obtaining resources needed to provide the identified training.

2.2. MAJCOM career field managers ensure their training programs complement the CFETP mandatory initial skill and upgrade requirements. They also identify the needed AFJQS/AFQTPs to document unique upgrade and continuation training requirements. Requirements are satisfied through OJT, resident training, or exportable courseware/courses. MAJCOM developed training to support this AFSC must be identified for inclusion into this plan.

2.3. 81 TRSS Qualification Training Flight (Q Flt) personnel develop AFJQS/AFQTPs based on requests submitted by the MAJCOMs and according to priorities assigned by the Communications-Electronics (C-E) Maintenance Training Advisory Group (MATAG) Working Group.

2.4. Unit level training managers and supervisors manage and control progression through the career field by ensuring each individual completes the mandatory training requirements for upgrade specified in this plan and supplemented by their MAJCOM. The list of courses in Part II is used as a reference for planning continuation or career enhancement training.

3. Coordination and Approval. The AFCFM is the approval authority. MAJCOM representatives and AETC training personnel coordinate on the career filed training requirements. The AFCA Mission Area Manager (MAM) reviews CFETPs for accuracy prior to submission for approval by the AFCFM.

Section B - Career Field Progression and Information

4. Specialty Descriptions. This information supplements that presented in AFMAN 36-2108.

4.1. **Telephone Systems Apprentice/Journeyman.**

4.1.1. Specialty Summary. Installs, removes, refurbishes, tests, and troubleshoots fixed and mobile telephone switching equipment, telephone key systems, telephone subsets, T-carrier, fiber-optic modems, multiplexers, line drivers, associated hardware and wiring supporting command, control, communications, and computer (C4) systems.

4.1.2. Duties and Responsibilities.

4.1.2.1. Installs, removes, and maintains telephone systems. Maintains and repairs telephone switching equipment, telephone key equipment, and telephone subsets. Maintains and initiates call routing translations for lines, trunks, and special service circuits. Installs, removes, and repairs telephone wiring, modems, terminal blocks, and telephone instruments within a building. Straps key units; programs and assigns special line and trunk features. Climbs structures to install, remove, or maintain telephone wiring. Monitors and analyzes switch performance using log reports and operational measurement reports. Troubleshoots telephone and data circuits using diagrams and standard and engineered drawings. Monitors and analyzes the performance of C4 copper core and fiber optic systems. Maintains digital transmission facilities including D-4 channel banks, multiplexers, channel service units, fiber-optic drivers/multiplexers, digital echo suppressers, and T-1 span repeater terminating equipment's. Maintains ancillary equipment such as radio pager interface, land mobile radio interface, and power equipment including rectifiers, inverters, and both acid and jell cell battery banks.

4.1.2.2. Operates and performs operator maintenance on special purpose vehicles, tools, and test equipment.

4.1.2.3. Maintains records. Prepares, interprets, and updates communications and computer systems installation records (CSIRS) on the installation and maintenance of telephone systems and associated hardware. Maintains various telephone and circuit records, forms, databases, and technical manuals.

4.2. **Telephone Systems Craftsman.**

4.2.1. Specialty Summary. Includes all information in paragraph 4.1.1., Telephone Systems Apprentice/Journeyman. Plans, schedules, and performs installation and maintenance on telephone switching equipment, telephone key systems, telephone subsets, T-carrier, fiber-optic modems, multiplexers, and line drivers and associated hardware.

4.2.2. Duties and Responsibilities.

4.2.2.1. Plans and schedules telephone system installation and maintenance actions. Interprets sketches and layout drawings for placement of equipment and telephones. Reviews, develops and implements changes to communication and computer systems installation records (CSIRs), standard and engineered drawings, wiring diagrams, project plans and worksheets. Instructs and performs installation procedures. Plans interior house wiring and wiring and programming of telephone system equipment. Tests and verifies equipment meets operational requirements.

4.2.2.2. Inspects and evaluates telephone system. Inspects telephone systems for operation, proper installation, and compliance with specifications. Interprets inspection reports and implements corrective action. Analyzes traffic load and telephone number assignments. Evaluates engineering plans for telephone systems.

4.2.2.3. Performs telephone system installation and maintenance actions. Installs, removes, and maintains telephone key systems, telephone subsets, and associated equipment. Maintains telephone switching equipment.

4.3. **Telephone and Distributed Systems Superintendent.**

4.3.1. Specialty Summary. Superintends installation and maintenance actions on all antenna, cable and telephone systems supporting command, control, communications, and computer (C4).

4.3.2. Duties and Responsibilities. This specialty "caps" at the Senior Master Sergeant level with those personnel who came-up through the 2E6X1, 2E6X2, and 2E6X3 career fields. Therefore, the duties and responsibilities defined below encompass the complete spectrum of all three of these specialties.

4.3.2.1. Plans, organizes, and directs antenna, cable, and telephone installation and maintenance activities. Develops and improves work methods and procedures related to installation and maintenance actions on all antenna, cable and telephone systems.

4.3.2.2. Directs antenna, cable, and telephone installation and maintenance activities. Assigns project priorities. Organizes work teams. Schedules installation and maintenance actions.

4.3.2.3. Inspects and evaluates antenna, cable, and telephone project and maintenance actions. Develops antenna, cable, and telephone systems organizational structure. Conducts inspection of antenna, cable, telephone systems, and construction activities for C4 systems. Evaluates work for compliance with standards. Evaluates inspectors' findings and takes appropriate action. Interprets plans and specifications. Establishes requirements for tools, test equipment, vehicles, manpower, and equipment.

4.4. **Chief Enlisted Manager (CEM) Code 2E000, Communications Systems Manager.** Personnel attaining the rank of Chief are assigned broad ranging duties in directing and managing diverse functions such as directing activities that install, remove, relocate, repair, and maintain telephone cable systems, antenna systems, telephone premise equipment and circuits, and telephone switching systems. Other challenges that these Chiefs face are assignments to the White House Communications Agency, Air Force Element at CENTCOM, the Air Force Communications Agency (AFCA), Defense Information Systems Agency, NATO, etc.

5. Skill/Career Progression. Adequate training and timely progression from the apprentice to the superintendent skill level plays an extremely important role in the Air Force's ability to accomplish its mission. Therefore, it is essential that everyone involved in career field training do their part to plan, develop, manage, and conduct an effective and efficient training program. The guidance provided in this part of the CFETP ensures individuals receive viable training at the appropriate points in their careers. The following narrative and AFSC 2E6X3 Education and Training Path table establish guidance for the "training road map." It defines what training is required and the year group spectrum in an individual's career when the training should be received.

5.1. Apprentice (3-Level) Training. Initial skills training in the Telephone Systems specialty consists of task and knowledge training provided in the 3-level resident courses located at Lackland AFB TX and Sheppard AFB TX. Initial skills training requirements were identified during the August 1997 Utilization and Training Workshop. The decision to train specific tasks and knowledge items was based on a review of Occupational Survey Report (OSR) data, Training Requirements Analysis (TRA) data, and input from AFS subject matter experts. Task and knowledge training requirements are identified in the Attachments 1 and 2 of the Specialty Training Standard (STS). In order to be awarded AFSC 2E633 individuals must complete the initial skills course.

5.2. Journeyman (5-Level) Training. Upgrade training to the 5-level in the Telephone Systems specialty consists of tasks and knowledge training provided in the CDC in addition to AFJQS/AFQTP requirements.

Upgrade and qualification training requirements for the 5-level are identified in Attachment 3 of the STS and in applicable AFJQS/AFQTP included in Part II. Training requirements are also listed in the Education and Training Path table. In order to be awarded AFSC 2E653, an individual must successfully complete CDC 2E653 and be certified on those items identified by an "X" in AFJQS 2EXXX-200B, 2EXXX C-E Enlisted Specialty Training. They must also be certified on all items identified by an "X" in the OJT upgrade column of the 2E653 CTG, items identified by an "X*" that are assigned to their duty position, items identified by a "-" that are required by the local unit, and also be certified on assigned AFJQS/AFQTP tasks (AFI 36-2101 and AFMAN 36-2108). Continuation training is available upon award of the 5-level and should be utilized based on an individual's particular duty position or other training needs. Continuation training is available but not limited to the training listed in Part II of this plan.

5.3. Craftsman (7-Level) Training. Upgrade and qualification training requirements for the Telephone Systems specialty consist of those items shown in the Education and Training Path table. In order to be awarded AFSC 2E673, an individual must successfully complete the mandatory 7-level minimum upgrade requirements to include AFQTP 2EXXX-201L, C-E Work Center Managers Handbook and resident Communications-Electronics Career Advancement Course (E3AAR2EX7X 000 at Keesler AFB MS or L3AAR2EX7X 000 at Lackland AFB TX). They must also be trained and certified on assigned AFJQS/AFQTP tasks. Continuation training is available, but not limited to the training listed in Part II of this plan. It should be utilized based on individual's particular training needs. Future upgrade training requirements for the 7-level will be identified in the STS.

5.4. Superintendent (9-Level) Training. Upgrade training requirements consist of those items shown in the Education and Training Path table, for example AFQTP 2EXXX-201LB, C-E Managers Handbook. In addition to the Senior Noncommissioned Officer Academy (SNCOA) course, completion of CDCs associate with career fields outside of their career ladder is recommended, preferably as they are working toward their 9-level. Also, because this specialty "caps" at the Senior Master Sergeant level with personnel that came-up through the 2E6X1, 2E6X2, and 2E6X3 career fields, it is highly recommended that personnel in upgrade training to this skill level learn the duties and responsibilities associated with AFSCs 2E6X1 and 2E6X2.

6. Training Decisions. The CFETP was developed to encapsulate an entire spectrum of training requirements for the Telephone Systems career field, using a building block approach (simple to complex). Included in this spectrum was the strategy of when, where, and how to meet the training requirements. The strategy must be apparent and affordable to reduce duplication of training and eliminate a disjointed approach to training. The following training decisions were made during the August 1997 Utilization and Training Workshop.

6.1. Initial Skills: The initial skills course was reviewed and minor course adjustments were made. Common tasks were combined (Principles of Telephony), specialized tasks were added (Telephone (Substation and Key) and Digital Switches (DMS-100 and MSL-100)), and outdated equipment and responsibility changes were deleted (Intercom-Type Panels (601,602,603) and pole climbing (cable maintenance pick up responsibility)).

6.2. Upgrade Training: The 5-level CDC was reaccomplished to support the information added or updated to reflect changes in fielded equipment. Supplemental training courses and AFJQS/AFQTPs were revalidated and non-essential courses were eliminated. Upgrade requirements for 7-level are identified in the Education and Training Path table. Skill requirements for 9-level upgrade were established through the C-E MATAG Working Group with AFQTP 2EXXX-201LB providing familiarization on the broad spectrum of communications equipment and systems.

6.3. Continuation Training: Any additional knowledge and skill requirements which were not taught through initial skills or upgrade training were assigned to continuation training. The purpose of the continuation training program is to provide additional advanced training exceeding the minimum upgrade training requirements with the emphasis on present and future duty positions. MAJCOMs may develop a

continuation training program to ensure individuals in the Telephone Systems specialty receive the necessary training at the appropriate point in their career. The training program will identify both mandatory and optional training requirements.

7. Community College of the Air Force (CCAF) Academic Programs. Enrollment in CCAF occurs upon completion of basic military training. CCAF provides the opportunity for all enlisted members to obtain an Associate in Applied Sciences degree. The degree must be completed before the student separates from the Air Force, retires, or is commissioned as an officer. In addition to its associate degree program, CCAF offers the following:

7.1. Occupational Instructor Certification. The College offers the Occupational Instructor Certification to instructors teaching full time in a CCAF affiliated school. To qualify, instructors must complete an instructor course, a teaching practicum, have two years teaching experience, hold an associate or higher degree, and be recommended by their commander/commandant.

7.2. Trade Skill Certification. When a CCAF student separates or retires, a trade skill certification is awarded for the primary occupational specialty. The College uses a competency based assessment process for trade skill certification at one of four proficiency levels - Apprentice, Journeyman, Craftsman/Supervisor, or Master Craftsman/Manager. All are transcribed on the CCAF transcript.

7.3. The Electronic Systems Technology (4VHP) program applies to 2EXXX career fields.

7.3.1. Degree Requirements: The 5-level must be held at the time of program completion.

	Semester Hours
Technical Education	24
Leadership, Management, and Military Studies	6
Physical Education	4
General Education	15
Program Elective	15
Total	64

7.3.2. Technical Education (24 semester hours): A minimum of 12 semester hours of Technical Core subjects and courses must be applied and the remaining semester hours applied from Technical Core/Technical Elective subjects and courses.

7.3.3. Leadership, Management, and Military Studies (6 semester hours): Professional Military Education and/or civilian management courses. See CCAF General Catalog for application of civilian management courses.

7.3.4. Physical Education (4 semester hours): Satisfied by completion of basic military training.

7.3.5. General Education (15 semester hours): Courses must meet the criteria for application of courses to the General Education requirement and be in agreement with the definitions of applicable General Education subjects/courses as provided in the CCAF General Catalog.

7.3.6. Program Elective (15 semester hours): Satisfied with applicable Technical Education; Leadership, Management, and Military Studies, or General Education courses, including natural science courses meeting General Education requirement application criteria. Six semester hours of CCAF degree applicable technical credit otherwise not applicable to this program may be applied.

7.4. See the CCAF General Catalog for details regarding the Associates of Applied Science in Electronics Systems Technology. The catalog is available at your education officer or from http://www.au.af.mil/au/ccaf.

7.5. Additional off-duty education is a personal choice that is encouraged for all. Individuals desiring to become an Air Education and Training Command instructor should be actively pursuing an Associate degree. A degreed faculty is necessary to maintain CCAF's accreditation through the Southern Association of Colleges and Schools.

8. Career Path Information. The following summarizes career progression and personnel allocations across the career ladder. 2E6X1, 2E6X2, and 2E6X3 personnel maintain their individual AFSC identifiers through the rank of MSgt. Upon promotion to SMSgt, these AFSCs merge to become a 2E690. At Chief, the 2E690 merges with other 2EXXX 9-level specialties to become a 2E000. Current demographic information is available on the Web at http:\\www.afpc.randolpf.af.mil/demographics/demograf/CAFSC.html.

2E6X3, TELEPHONE SYSTEMS
EDUCATION AND TRAINING PATH

EDUCATION AND TRAINING REQUIREMENTS	AVERAGE SEW ON TIME AND COMMENTS
BASIC MILITARY TRAINING SCHOOL	
APPRENTICE TECHNICAL SCHOOL - 3 SKILL LEVEL J3ABR2E633 000..... Mandatory	Airman .....6 months
UPGRADE TO JOURNEYMAN - 5 SKILL LEVEL Minimum 15 months OJT training. Complete 5-Level CDC's. ..... Mandatory Specific AFJQS/AFQTPs for equipment at assigned location. ..... Mandatory Maintenance Management and Generic AFJQS/AFQTPs for various unit level duties..... Mandatory AETC Supplemental training courses as determined by MAJCOM ..... Optional AFETS/CFS/SMT training as determined by MAJCOM..... Optional	A1C .....16 months SrA .....36 months Earliest .....36 months HYT .....10 years
AIRMAN LEADERSHIP SCHOOL (ALS) Attendance is limited to SSgt selectees or those attaining 48 months Total Active Federal Military Service (TAFMS) and who have not been selected for promotion to SSgt. Completion is mandatory before assuming the rank of SSgt. ANG/AFRC may complete by correspondence course. ..... Mandatory	TRAINER: Any rank may qualify as a trainers provided they: attend a formal OJT Trainer course, are officially appointed by the commander, and are certified on the task they are training.
UPGRADE TO CRAFTSMAN - 7 SKILL LEVEL Minimum rank of SSgt. 18 months OJT training. Completion of AFQTP 2EXXX-201L, Work Centers Managers Handbook. Attendance at formal 7-level school. Must be 7-level to sew on TSgt..... Mandatory Maintenance Management and Generic AFJQS/AFQTPs for various unit level duties..... Mandatory AETC Supplemental training courses as determined by MAJCOM ..... Optional AFETS/CFS/SMT training as determined by MAJCOM..... Optional	SSgt .....7.5 years Earliest .....36 months HYT .....20 years TSgt .....12.5 years Earliest .....5 years HYT .....20 years CERTIFIER: Must be a SSgt and possess at least a 5-skill level or equivalent experience (civilian), attend a formal OJT Certifier course, be officially appointed by the commander and certified on the task they are certifying. Be a person other than the trainer.

2E6X3, TELEPHONE SYSTEMS
EDUCATION AND TRAINING PATH

EDUCATION AND TRAINING REQUIREMENTS	AVERAGE SEW ON TIME AND COMMENTS
NONCOMMISSIONED OFFICER ACADEMY (NCOA). Attendance is limited to TSgt's or TSgt selectees. Completion is mandatory before assuming the rank of MSgt. ANG/AFRC may attend in-residence as SSgt or TSgt or complete correspondence course. NCOA Correspondence Course ..... Optional	MSgt .....16 years Earliest .....8 years HYT .....24 years
USAF SENIOR NONCOMMISSIONED OFFICER ACADEMY (SNCOA) Attendance is limited to SMSgt's or SMSgt selectees or selected MSgt's. Completion is mandatory before assuming the rank of CMSgt. ..... Mandatory SNCOA Correspondence Course ..... Optional ANG/AFRC may complete by correspondence course. ANG/AFRC MSgt's may attend in-residence. ..... Mandatory	SMSgt .....19.2 years Earliest .....11 years HYT .....26 years
UPGRADE TO SUPERINTENDENT - 9 SKILL LEVEL Minimum rank of SMSgt. Must be graduate of resident SNCOA. (Per above section, ANG/AFRC may complete by correspondence course.) Complete AFQTP 2EXXX-201LB, C-E Managers Handbook. ..... Mandatory Maintenance Management and Generic AFJQS/AFQTPs for various unit level duties. ..... Mandatory	CMSgt .....21.5 years Earliest .....14 years HYT .....30 years

Section C - Skill Level Training Defined

9. Purpose. The various skill levels in the career field are defined in terms of tasks and knowledge requirements for each skill level in the Telephone Systems career field of the Communications-Electronics Systems career ladder. They are stated in broad, general terms and establish the standards of performance. An all-encompassing core task list has not been developed for this specialty because of the diversity of the missions supported, and the equipment installed to meet mission requirements. Core tasks, knowledge items, and skill requirements for this specialty are identified in the STS, CDC, AFJQS/AFQTPs, etc. Completion of the mandatory 3-level skill awarding course, the mandatory use and completion of CDCs, the mandatory 7-level course, and the completion of applicable AFJQS/AFQTPs define the Air Force core tasks for this specialty.

10. Specialty Qualifications.

10.1. **Apprentice (3-Level) Training Requirements.**

10.1.1. Qualification Requirements. Completion of high school with courses in analytical mathematics is desirable. Normal color vision, normal depth perception, normal gait and balance, physical ability to perform climbing duties, freedom from fear of heights and claustrophobia, and qualification to operate a government vehicle are mandatory for entry, award, and retention of this AFSC. Eligibility for a Secret security clearance is mandatory for award and retention of the semi-skilled and skilled AFSCs.

10.1.2. Training Sources. Formal training for Electronic Fundamentals/Applications is accomplished through attendance at course L3AQR2E633 400, Lackland AFB TX. Attachment 1 of the STS identifies all training received in this course. Formal training for AFSC specific topics is accomplished through the J3ABR2E633 000 course at Sheppard AFB TX. Attachment 2 of the STS identifies all training received in this course.

10.1.3. Training Resources.

10.1.3.1. The 344 TRS, Lackland AFB TX provides Electronics Fundamentals/Applications knowledge and performance training.

10.1.3.2. The 364 TRS, Sheppard AFB TX provides training on equipment and knowledge requirements.

AF Occupational Safety and Health (AFOSH) Program.
Telephone System Fundamentals
Communication-Computer Records - Wire Communications Systems
Sub-Station Installation
1A2 Key Telephone System Installation And Maintenance
Solid State Telephone Intercom Systems
Station Programmable Electronic Key Telephone System (Tie Businesscom Plus)
Keyboard Programmable PABX/Electronic Key Telephone System (ITT 3100)
Fiber Optics
Wire Transmission Principles
Northern Telecom Incorporated (NTI) Digital Switching Systems
Digital Switching System Preventative Maintenance
Diagnose and Correct Digital Switching System Faults
Tactical Communications
Switch Security

10.1.4. Implementation. Entry into training is accomplished by reserving a position in the career field upon entry into the Air Force.

10.2. **Journeyman (5-Level) Training Requirements.**

10.2.1. Qualification Requirements. Qualifications in and possession of AFSC 2E633. Additionally, knowledge is mandatory of: maintenance management, installation, and maintenance action procedures for telephone systems. Experience is mandatory in functions such as installing and maintaining telephone systems, T-carrier, fiber-optic modems, associated hardware equipment, and test equipment.

10.2.2. Training Sources. CDCs provide the required career knowledge training. The 2E6X3 CTG shows the tasks that are trained through the CDC material and those mandatory tasks required for upgrade training. Continuation/qualification training is provided by qualified trainers using AFJQS/AFQTPs written for equipment end items.

10.2.3. Training Resources. CDC 2E653 is available for upgrade purposes through the unit training manager. For individual qualification and cross-utilization training, CDCs are ordered through the unit training office. AFJQS/AFQTPs are Air Force publications and are mandatory for use in qualification training. Instructions are provided in AFIND8 for requesting current AFJQS/AFQTPs. AFJQS/AFQTPs are distributed on the Q-MAIL CD ROM developed by the 81 TRSS Q Flt or may be downloaded from their home page at internet address http://www.keesler.af.mil/81trss/qflight. Procedures for requesting development of AFJQS/AFQTPs are contained in AFI 36-2233. AFJQS/AFQTPs are listed in Part II, Section D of this CFETP. Air Force Engineering and Technical Service (AFETS), Contract Field Service (CFS), and Special Maintenance Team (SMT) training may be requested to provide on-site training on Telephone Systems equipment maintenance subjects. The AFETS program is outlined in AFI 21-110. Requests for AFETS, CFS or SMT training should be directed to your MAJCOM.

10.2.4. Implementation. Entry into formal journeyman upgrade training is accomplished once an individual is assigned to their first duty station. Qualification training is initiated anytime an individual is assigned duties that they are not qualified on. CDCs and AFJQS/AFQTPs should be used concurrently to obtain the necessary qualification for refresher and cross-utilization training.

10.3. **Craftsman (7-Level) Training Requirements.**

10.3.1. Qualification Requirements. Qualifications in and possession of AFSC 2E653. Additionally, knowledge is mandatory of: CSIRs, test equipment, and special tools required for installation and maintenance actions on telephone systems. Also, experience is mandatory in supervising functions such as telephone system installation and maintenance actions or commercial communications activities.

10.3.2. Training Sources. Completion of AFQTP 2EXXXX-201L, Communications-Electronics Work Center Managers Handbook is mandatory. Formal 7-level training is accomplished at Keesler AFB MS (E3ACR2EX7X 002 (Active Duty), -003 (Guard)) or at Lackland AFB TX (L3ACR2EX7X 002 (Active Duty only)). Continuation/qualification training is provided by qualified trainers using AFJQS/AFQTPs written for equipment end items and unit management functions.

10.3.3. Training Resources. For individual qualification and cross-utilization training, the CDC can be ordered through the unit training office. AFJQS/AFQTPs are Air Force publications and are mandatory for use in qualification training. Instructions are provided in AFIND8 for requesting current AFJQS/AFQTPs. AFJQS/AFQTPs are distributed on the Q-MAIL CD ROM developed by the 81 TRSS Q Flt or may be downloaded from their home page at internet address http://www.keesler.af.mil/81trss/qflight. Procedures for requesting development of new AFJQS/AFQTPs are contained in AFI 36-2233. AFJQS/AFQTPs are listed in Part II, Section D of this CFETP. AFETS, CFS, and SMT training may be requested to provide on-site training on Telephone Systems equipment maintenance subjects. The AFETS program is outlined in AFI 21-110. Requests for AFETS, CFS or SMT training should be directed to your MAJCOM.

10.3.4. Implementation. Entry into OJT is initiated when an individual has obtained the necessary rank and skill level. Qualification training is initiated anytime an individual is assigned duties that they are not

qualified on. CDC and AFJQS/AFQTPs should be used concurrently to obtain the necessary qualification for refresher and cross-utilization training.

10.4. **Superintendent (9-Level) Training Requirements.**

10.4.1. Qualification Requirements. Qualification is mandatory as a Telephone Systems Craftsman, Communications Antenna Systems Craftsman, or Communications Cable Systems Craftsman. Also, knowledge is mandatory of: maintenance management; principles of telephony, electronics, and light wave transmissions, installation actions; electromechanical and digital telephone switching systems; telephone equipment and data circuitry; cable systems; and antenna systems. Experience is mandatory in supervising installation and maintenance in areas such as telephone systems, communications antenna systems, communication cable systems, or activities.

10.4.2. Training Sources. Completion of AFQTP 2EXXX-201LB, Communications-Electronics Managers Handbook is mandatory. Completion of CDCs associated with related 2E6XX career fields is recommended.

RELATED 2E6XX CAREER FIELDS
2E6X1 Communications Antenna Systems
2E6X2 Communication Cable Systems

10.4.3. Training Resources. For individual qualification training, CDC can be ordered through the unit training office. AFJQS/AFQTPs are Air Force publications, obtained through normal publication channels, and are requested through the unit training manager. AFJQS/AFQTPs are available for a large number of AFSCs, Maintenance Management, and Generic Training Products. These products are listed in Part II, Section D of this CFETP and other related AFSC's Career Field Education and Training Plan.

10.4.4. Implementation. Entry into OJT is initiated when an individual has been selected for the rank of SMSgt. Qualification training is initiated any time an individual is assigned duties they are not qualified on.

Section D - Resource Constraints

11. Purpose. This section identifies known resource constraints which preclude optimal/desired training from being developed or conducted, including information such as part numbers, national stock numbers, number of units required, cost, manpower, etc. Narrative explanations of each resource constraint and an impact statement describing what effect each constraint has on training are included. Finally, in this section, actions required, OPR, and target completion date are included. Resource constraints will be, at a minimum, reviewed and updated annually.

12. Apprentice Level Training.

12.1. Constraint: None.

12.1.1. Impact. N/A

12.1.2. Resources Required. N/A

12.1.3. Action Required. N/A

12.2. OPR/Target Completion Date. N/A

13. Five-Level Training.

13.1. Constraint: None.

13.1.1. Impact. N/A

13.1.2. Resources Required. N/A

13.1.3. Action Required. N/A

13.2. OPR/Target Completion Date. N/A

14. Seven-Level Training.

14.1. Constraints: The following constraints apply to this specialty:

14.1.1. CDCs. AFCA polled the MAJCOM subject matter experts (Nov 97) and determined that AFSC specific 7-level CDCs are not required for this specialty.

14.1.2. Formal Course. Course E/L3ACR2EX7X-002/003 is available. Responsibility to ensure currency of course was transferred to the C-E MATAG Working Group. Course content will be reviewed annually.

14.1.3. Impact. N/A

14.1.4. Resources Required. N/A

14.1.5. Action Required. N/A

14.2. OPR/Target Completion Date. N/A

Section E - Transition Training Guide

This section not used.

PART II

Section A, Specialty Training Standard

1. Implementation. Implementation of this STS is with the class beginning 981001 and graduating 990121.

2. Purpose. As prescribed in AFI 36-2201, this STS:

2.1. The Course Training Standards (CTS at Attachments 1 and 2)

2.1.1. Establish the training requirements for airman to perform 3-skill level duties in the Telephone Systems ladder of the Airman Communications-Electronic Systems career field. The training tasks are based on an analysis of duties in AFMAN 36-2108 for AFSC 2E633.

2.1.2. Provide the basis for the development of more detailed training materials, training objectives, and training evaluation instruments for this course.

2.1.3. Shows formal training requirements. Lists in Attachment 1 the electronic fundamentals and applications requirements for this specialty. Only those items coded are required by this AFSC. Students attend AETC course L3AQR2E633 400 at Lackland AFB TX.

2.1.4. Attachment 2 contains a list of behavioral and enabling statements which describe knowledge and job performance requirements that the graduate demonstrates on the job as a result of training received in course J3ABR2E633 000 (PDS Code XPV) as described in the Air Force Education and Training Course Announcements (ETCA) database, formally AFCAT 36-2223, USAF Formal Schools Catalog. Constraints and/or guidelines to training are explained Part I, Section D and in the Preface to Attachment 2. When notes or explanations describe constraints in the skill awarding course they indicate that training on those items is restricted due to the limitation described.

2.2. The 5-Level Career Training Guide (CTG) at Attachment 3:

2.2.1. Provides a complete list of continuation training requirements for the award of AFSC 2E653. The behavioral code key used to indicate the type of training provided by career development courses is contained as part of Attachment 3.

2.2.2. Identifies the mandatory task and knowledge training, as listed in Attachment 3, which is required for the 5-skill level in the Telephone Systems ladder of the Airman Communications-Electronics Systems career field. These are based on an analysis of duties and responsibilities as outlined in AFMAN 36-2108.

2.2.3. Provides OJT certification columns to record completion of task and knowledge training requirements. Use automated training management systems to document technician qualifications, if available. Task certification must show a start and stop date.

2.2.4. Becomes a job qualification standard for on-the-job training when placed in AF Form 623, On-the-Job Training (OJT) Record, and used according to AFI 36-2201. OJT tasks in column 1 are trained to the go/no go level. Go means the individual can perform the task without assistance and meet local requirements for accuracy, timeliness, and correct use of procedures.

2.2.4.1. Training Documentation. Document and certify completion of training. Identify duty position requirements by circling the subparagraph number next to the task statement. Complete the following columns in Part II of the CFETP:

2.2.4.1.1. Initial Certification. Evaluate qualifications and when verified certify using:

2.2.4.1.1.1. Core/Critical Tasks. Start date, stop date, trainee's initials, trainer's initials, and certifier's initials.

2.2.4.1.1.2. Non-Core/Non-Critical Tasks. Start date, stop date, trainee's initials, and trainer's initials.

2.2.4.1.2. Transcribing From Old Document to CFETP. Evaluate current qualifications and when verified recertify using:

2.2.4.1.2.1. Tasks Previously Certified and Required in Current Duty Position (Core/Critical Tasks). Current date as completion date, trainee's initials, and certifier's initials.

2.2.4.1.2.2. Tasks Previously Certified and Required in Current Duty Position (Non-Core/Non-Critical Tasks). Current date as completion date, trainee's initials, and trainer's initials.

2.2.4.1.2.3. Tasks Previously Certified but Not Required in Current Duty Position. Carry forward only the previous completion date of certification (not the initials of another person). If and when transcribed tasks become duty position requirements, recertify using standard certification procedures.

2.4.4.1.2.4. The person whose initials appear in the trainer or certifier block during the transcription process must meet the requirements of their prescribed roles.

2.2.4.1.2.5. Give the member the old CFETP upon completion of transcription.

2.2.4.1.3. Documenting Career Knowledge. When a CDC is not available: the supervisor identifies STS training references the trainee requires for career knowledge and ensures, as a minimum, that trainees cover the mandatory items in AFI 36-2108. For two time CDC course exam failures, supervisors identify al STS items corresponding to the areas covered by the CDC. The trainee completes study of the STS references, undergoes evaluation the task certifier, and receives certification on the STS. NOTE: Career knowledge must be documented prior to submitting a CDC waiver.

2.2.4.1.4. Decertification and Recertification. When an airman is found to be unqualified on a task previously certified, the supervisor lines through the previous certification or deletes previous certification when using an automated system. Appropriate remarks are entered on the AF Form 623A, On-The-Job Training Record Continuation Sheet, as to the reason for decertification. The individual is recertified using the normal certification process.

2.2.5. Indicates career knowledge provided in the 5-skill level CDCs. See ECI/AFSC/CDC listing maintained by the unit OJT manager for current CDC listings.

2.2.6. Is a guide for development of promotion tests used in the Weighted Airman Promotion System (WAPS). Specialty Knowledge Tests (SKT) are developed at the USAF Occupational Measurement Squadron by senior NCOs with extensive practical experience in their career fields. The tests sample knowledge of CTG subject matter areas judged by test development team members to be most appropriate for promotion to higher grades. Questions are based upon study references listed in the WAPS catalog. Individual responsibilities are in chapter 14 of AFI 36-2605.

3. Recommendations. Comments and recommendations are invited concerning quality of AETC training. Reference this STS and address correspondence regarding changes to 364 TRS/TRR, 511 9th Ave Ste 1, Sheppard AFB TX 76311-2338. Use AETC's Graduate Assessment Survey (GAS) to identify unsatisfactory performance of individual graduates. A Customer Service Information Line (CSIL) has been installed for the supervisor's convenience to identify graduates who may have received over or

under training on task/knowledge items listed in this training standard. For a quick response to problems, call our CSIL, DSN 736-2574, anytime day or night.

BY ORDER OF THE SECRETARY OF THE AIR FORCE

OFFICIAL

MICHAEL E. ZETTLER, Major General, USAF
Deputy Chief of Staff/Installations & Logistics

Attachments:
1. Electronic Fundamentals/Applications Course Training Standard
2. Course Training Standard, 2E633
3. Five-Level Career Training Guide, 2E653

PREFACE

NOTE 1: Objectives which include the statement “with assistance” indicates that students may be allowed two assists from the instructor and still successfully achieve the proper level of proficiency. An instructor assist is defined as anytime an instructor must intercede to provide guidance to a student which leads to a satisfactory completion of the objective or to prevent the student from continuing in a manner which will lead to an unsatisfactory conclusion, safety violation, or damage to equipment. Objectives which include the statement “without assistance” indicates that students must successfully complete the objective without instructor intervention.

NOTE 2: Objectives identified by “③” are taught in residence as part of the Electronics Principles portion of the 3-level skill awarding course.

NOTE 3: Objectives identified by “⑤” are included in the 5-level Career Development Course (CDC). The statement itself combined with the verb selection reflects the depth of the information presented in the CDCs.

NOTE 4: All objectives identified by “③” are trained during wartime.

1. BASIC TERMS.
TR: TOs 31-1-141-2, 31-1-141-5

1.1. Metric Notation.

1.1.1. Perform conversions using metric notation and electrical prefixes. (③)

1.1.2. Perform math operations using powers of ten. (③)

1.2. Identify direct current (DC) terms properly. (③/⑤)

1.3. Identify alternating current (AC) terms properly. (③/⑤)

2. BASIC CIRCUITS.
TR: TOs 31-1-141-2, 31-1-141-9

2.1. Identify basic circuit operating principles. (③/⑤)

2.2. Troubleshoot a faulty basic electronic circuit. (③/⑤)

3. BASIC CIRCUIT CALCULATIONS.
TR: TO 31 1-1415

3.1. Calculate circuit values for a basic DC circuit. (③/⑤)

3.2. Calculate circuit values for a basic AC circuit. (③/⑤)

4. RESISTORS.
TR: TOs 31-1-141-2, 31-1-141-15

4.1. Identify resistor operating principles. (③)

4.2. Isolate faulty resistors. (③)

4.3. Use a resistor color code chart to determine facts about resistors. (③)

5. RELAYS AND SOLENOIDS.
TR: TOs 31-1-141-2, 31-1-141-3

5.1. Identify relay circuit operating principles. (③)

5.2. Isolate a faulty relay. (③)

5.3. Identify solenoid circuit operating principles. (③)

5.4. Isolate a faulty solenoid. (③)

6. INDUCTORS.
TR: TOs 31-1-141-2, 31-1-141-15

6.1. Identify inductor operating principles. (③)

6.2. Isolate a faulty inductor. (③)

6.3. Calculate inductor circuit values. (③)

7. CAPACITORS.
TR: TOs 31-1-141-2, 31-1-141-5, 31-1-141-15

7.1. Identify capacitor operating principles. (③)

7.2. Isolate a faulty capacitor. (③)

7.3. Calculate capacitor circuit values. (③)

7.4. Use capacitor color code chart to determine facts about capacitors.

8. TRANSFORMERS.
TR: TOs 31-1-141-2, 31-1-141-5, 31-1-141-15

8.1. Identify transformer operating principles. (③)

8.2. Isolate a faulty transformer. (③)

8.3. Calculate transformer circuit values. (③)

9. THREE PHASE TRANSFORMERS.
TR: TOs 31-1-141-2, 31-1-141-15

9.1. Identify three phase transformer operating principles. (③)

9.2. Isolate a faulty three phase transformer.

10. DC MOTORS.
TR: TOs 31-1-141-2, 31-1-141-9

10.1. Identify DC motors operating principles. (③)

10.2. Isolate a faulty DC motor.

11. AC MOTORS.
TR: TOs 31-1-141-2, 31-1-141-9

11.1. Identify AC motors operating principles. (③)

11.2. Isolate a faulty AC motor.

12. DC GENERATORS.
TR: TOs 31-1-141-2, 31-1-141-9, 31-1-141-13

12.1. Identify DC generator principles of operation. (③)

12.2. Isolate a faulty DC generator.

13. AC GENERATORS.
TR: TOs 31-1-141-2, 31-1-141-9, 31-1-141-13

13.1. Identify AC generator principles of operation. (③)

13.2. Isolate a faulty AC generator.

14. ALTERNATORS.
TR: TOs 31-1-141-2, 31-1-141-9

14.1. Identify alternator principles of operation.

14.2. Isolate a faulty alternator.

15. SYNCHRO/SERVOS.
TR: TOs 31-1-141-2, 31-1-141-9

15.1. Identify synch/servos principles of operation. (③)

15.2. Isolate a faulty synch/servos circuit. (③)

16. CHOPPERS (SYNCHRONOUS VIBRATORS).
TR: TO 31-1-141-2

16.1. Identify choppers (synchronous vibrators) principles of operation.

16.2. Isolate a faulty chopper.

17. TRANSDUCERS.
TR: TOs 31-1-141-3, 31-1-141-13

17.1. Identify transducer principles of operation. (③)

17.2. Isolate a faulty transducer.

18. METER MOVEMENTS.
TR: TOs 31-1-141-2, 31-1-141-7, 31-1-141-14

18.1. Identify meter movement principles of operation. (③)

18.2. Isolate a faulty meter movement.

19. SOLID STATE DIODES.
TR: TOs 31-1-141-4, 31-1-141-15

19.1. Identify solid state diode operating principles. (③)

19.2. Isolate a faulty solid state diode circuit. (③)

19.3. Identify solid state diode specifications.

19.4. Use solid state diode color code chart to determine facts about the diode.

20. BIPOLAR JUNCTION TRANSISTOR.
TR: TO 31-1-141-4

20.1. Identify bipolar junction transistor operating principles. (③)

20.2. Isolate a faulty bipolar junction transistor circuit. (③)

20.3. Identify bipolar junction transistor specifications.

21. INTEGRATED CIRCUITS.
TR: TO 31-1-141-4

21.1. Identify facts and terms associated with integrated circuits (IC). (③)

21.2. Isolate faulty integrated circuits. (③)

21.3. Identify integrated circuit specifications

22. SOLID STATE SPECIAL PURPOSE DEVICES.
TR: TO 31-1-141-4

22.1. Identify operating principles of special purpose devices.

22.1.1. Identify silicon controlled rectifier (SCR) operating principles. (③)

22.1.2. Identify zener diode operating principles. (③)

22.1.3. Identify tunnel diode operating principles. (③)

22.1.4. Identify light emitting diode (LED) operating principles. (③)

22.1.5. Identify liquid crystal display (LCD) operating principles. (③)

22.1.6. Identify unijunction transistor (UJT) operating principles. (③)

22.1.7. Identify junction field effect transistor (JFET) operating principles. (③)

22.1.8. Identify metal oxide semiconductor field effect transistor (MOSFET) operating principles. (③)

22.1.9. Identify positive intrinsic negative (PIN) diode operating principles. (③)

22.1.10. Identify varactor operating principles. (③)

22.2. Faulty special purpose devices. (③)

22.2.1. Isolate a faulty silicon controlled rectifier SCR.

22.2.2. Isolate a faulty zener diode.

22.2.3. Isolate a faulty tunnel diode.

22.2.4. Isolate a faulty LED.

22.2.5. Isolate a faulty LCD.

22.2.6. Isolate a faulty UJT.

22.2.7. Isolate a faulty JFET.

22.2.8. Isolate a faulty MOSFET.

22.2.9. Isolate a faulty PIN diode.

22.2.10. Isolate a faulty varactor.

23. ELECTRON TUBES.
TR: TOs 31-1-141-1, 31-1-141-3, 31-1-141-9

23.1. Identify electron tube operating principles.

23.2. Isolate a faulty electron tube.

23.3. Identify electron tube specifications.

24. CATHODE RAY TUBES (CRT).
TR: TOs 31-1-141-1, 31-1-141-3

24.1. Identify CRT operating principles. (③)

24.2. Isolate a faulty CRT.

25. SOLDER AND DESOLDER.
TR: TOs 00-25-234, 1-1A-14, 31-1-141-15

25.1. Terminal connections.

25.1.1. Solder and desolder terminal connections. (③)

25.1.2. Solder and desolder terminal connections without assistance.

25.2. Printed circuit boards.

25.2.1. Solder and desolder printed circuit board component connections. (③)

25.2.2. Solder and desolder printed circuit board component connections without assistance.

25.3. Multipin connectors.

25.3.1. Solder and desolder multipin connectors. (③)

25.3.2. Solder and desolder multipin connectors without assistance.

25.4. Coaxial connectors.

25.4.1. Solder and desolder coaxial connectors. (③)

25.4.2. Solder and desolder coaxial connectors without assistance.

26. ASSEMBLE SOLDERLESS CONNECTORS.
TR: TOs 1-1A-14, 31-1-141-15

26.1. Assemble solderless crimp connection. (③)

26.2. Assemble solderless coaxial connectors. (③)

26.3. Assemble solderless multipin connectors. (③)

27. TEST EQUIPMENT USAGE.
TR: TOs 31-1-141-1, 31-1-141-7, 31-1-141-8, 31-1-141-9, 31-1-141-10

27.1. Use the analog multimeter test equipment to measure current, voltage, and ohms. (③)

27.2. Use the oscilloscope test equipment to measure DC voltage, AC pk-pk voltage, time of AC wave, and phase difference of two waves with assistance. (③)

27.3. Use the signal generator to provide signals. (③)

27.4. Use the frequency counter to measure frequency.

27.5. Use the spectrum analyzer to analyze a multifrequency signal.

27.6. Use a field strength tester to test a radiated field.

27.7. Use the digital multimeter to measure current, voltage, and ohms. (③)

27.8. Use the digital logic probe to determine the logic state. (③)

27.9. Use the capacitor tester to determine the condition of a capacitor.

27.10. Use the capacitor substitution box to determine the capacitance.

27.11. Use the DC restorer to restore DC.

27.12. Use the logic current tracer to trace current.

27.13. Use the tube tester to determine the condition of a tube.

27.14. Use the logic purser to pulse a logic circuit. (③)

27.15. Use the logic analyzer to analyze a logic circuit.

27.16. Use the signature analyzer to determine the condition of a microprocessor circuit.

27.17. Use the reflectometer to determine the location and condition of a cable termination.

28. TRANSISTOR AMPLIFIER CIRCUITS.
TR: TOs 31-1-141-1, 31-1-141-4

28.1. Operating principles of transistor amplifier circuits.

28.1.1. Identify transistor amplifier operating principles. (⑤)

28.1.2. Identify transistor amplifier stabilization circuits operating principles. (③)

28.1.3. Identify transistor amplifier coupling circuits operating principles. (③)

28.2. Troubleshoot a faulty transistor amplifier circuit. (③)

29. ELECTRON TUBE AMPLIFIERS.
TR: TO 31-1-141-3

29.1. Identify electron tube amplifier operating principles.

29.2. Isolate a faulty electron tube amplifier.

30. OPERATIONAL AMPLIFIERS (OP AMP).
TR: TO 31-1-141-4

30.1. Identify operational amplifiers operating principles. (③)

30.2. Troubleshoot a faulty operational amplifier.

31. MAGNETIC AMPLIFIERS.
TR: TO 31-1-141-4

31.1. Identify magnetic amplifier operating principles.

31.2. Troubleshoot a faulty magnetic amplifier.

32. SATURABLE REACTORS.
TR: TO 31-1-141-4

32.1. Identify saturable reactor operating principles.

32.2. Troubleshoot a faulty saturable reactor.

33. POWER SUPPLY CIRCUITS.
TR: TOs 31-1-141-3, 31-1-141-4, 31-1-141-9, 31-1-141-15

33.1. Operating principles of power supply circuits.

33.1.1. Identify power supply rectifier operating principles. (③/⑤)

33.1.2. Identify power supply filter operating principles. (③)

33.2. Troubleshoot a faulty power supply circuit. (③)

34. VOLTAGE REGULATORS.
TR: TOs 31-1-141-3, 31-1-141-4

34.1. Identify power supply voltage regulator operating principles. (③)

34.2. Troubleshoot a faulty voltage regulator circuit. (③)

35. RESISTIVE-CAPACITIVE-INDUCTIVE (RCL) CIRCUITS.
TR: TOs 31-1-141-2, 31-1-141-5

35.1. Identify RCL basic (non-resonant) circuit operating principles. (③)

35.2. Identify RCL resonant circuit operating principles. (③)

35.3. Troubleshoot a faulty RCL circuit. (③)

35.4. Calculate RCL circuit values. (③)

36. FREQUENCY SENSITIVE FILTERS.
TR: TO 31-1-141-2

36.1. Identify frequency sensitive filter operating principles. (③)

36.2. Troubleshoot a faulty frequency sensitive filter circuit. (③)

36.3. Calculate frequency sensitive filter circuit values.

37. WAVE GENERATING CIRCUITS.
TR: TOs 31-1-141-3, 31-1-141-4, 31-1-141-10

37.1. Operating principles of wave generating circuits.

37.1.1. Identify oscillator circuit wave generating operating principles.

37.1.2. Identify multivibrator circuit wave generating operating principles.

37.1.3. Identify waveshaping circuit operating principles.

37.2. Troubleshoot a faulty wave generating circuit.

38. LIMITER CIRCUITS.
TR: TO 31-1-141-4

38.1. Operating principles of limiter circuits.

38.1.1. Identify diode limiter circuit operating principles.

38.1.2. Identify zener diode limiter circuit operating principles.

38.1.3. Identify transistor limiter circuit operating principles.

38.2. Troubleshoot a faulty limiter circuit.

39. CLAMPER CIRCUITS.
TR: TO 31-1-141-4

39.1. Identify clamper circuit operating principles.

39.2. Troubleshoot a faulty clamper circuit.

40. DIGITAL NUMBERING SYSTEMS.
TR: TO 31-1-141-5

40.1. Conversions.

40.1.1. Convert values in number systems to and from binary. (③)

40.1.2. Convert values in number systems to and from octal. (③)

40.1.3. Convert values in number systems to and from hexadecimal. (③)

40.2. Math operations.

40.2.1. Perform math operations using binary. (③)

40.2.2. Perform math operations using octal. (③)

40.2.3. Perform math operations using hexadecimal. (③)

40.3. Convert values in number systems to and from the binary code system. (③)

41. DIGITAL LOGIC FUNCTIONS.
TR: TOs 31-1-141-4, 31-1-141-9

41.1. Digital logic function operating principles.

41.1.1. Identify main logic gate operating principles. (③)

41.1.2. Identify flip-flop operating principles. (③)

41.2. Troubleshoot a faulty logic circuit. (③)

41.3. Identify types and operating principles of logic families. (③)

42. BOOLEAN EQUATIONS.
TR: TO 31-1-141-5

42.1. Convert Boolean expressions diagrammed to equations. (③)

42.2. Convert Boolean equations to diagrams. (③)

42.3. Simplify Boolean equations.

43. COMPUTERS.
TR: TOs 31-1-141-6C, 31-1-141-9

43.1. Identify computer operating principles. (③)

43.2. Load computer programs. (③)

43.3. Write and debug computer programs.

43.4. Isolate faulty major computer units.

43.5. Isolate faulty computer subassemblies or circuits.

43.6. Identify types of computer memories and their operating principles. (③)

43.7. Identify computer peripheral devices operating principles. (③)

43.8. Identify principles of computer programming languages.

44. MICROPROCESSOR CONTROLLED SYSTEMS.
TR: TOs 31-1-1416C, 31-1-141-9

44.1. Microprocessor controlled systems operating principles.

44.1.1. Identify universal microprocessor circuit operating principles in system control. (③)

44.1.2. Identify the 8085 (specific) microprocessor circuit operation principles in system control.

44.2. Troubleshoot a faulty microprocessor controlled circuit.

44.3. Perform operational functions on a microprocessor controlled system.

45. LOGIC CIRCUITS.
TR: TOs 31-1-141-3, 31-1-141-5, 31-1-141-9, 31-1-141-13

45.1. Logic circuits operating principles.

45.1.1. Identify counter logic circuit operating principles. (③)

45.1.2. Identify register logic circuit operating principles (③)

45.1.3. Identify combinational logic circuit operating principles. (③)

45.2. Troubleshoot a faulty logic circuit. (③)

46. DIGITAL-TO-ANALOG (D/A) AND ANALOG-TO-DIGITAL (A/D) CONVERTERS.
TR: TOs 31-1-141-13

46.1. Converters operating principles.

46.1.1. Identify weighted resistor D/A converter operating principles.

46.1.2. Identify approximation D/A converter operating principles. (③)

46.1.3. Identify ramp A/D converter operating principles. (③)

46.2. Isolate a faulty converter circuit.

47. TRANSMISSION LINES.
TR: TOs 31-1-141-7, 31-1-141-8, 31-1-141-9, 31-1-141-13

47.1. Identify transmission line operating principles.

47.2. Perform transmission line measurements.

47.3. Calculate transmission line values.

47.4. Isolate a faulty transmission line.

48. WAVEGUIDES.
TR: TOs 31-1-141-9, 31-1-141-11

48.1. Identify waveguide operating principles.

48.2. Isolate a faulty waveguide.

49. MICROWAVE OSCILLATORS AND AMPLIFIERS.
TR: TOs 31-1-141-3, 31-1-141-10, 31-1-141-11

49.1. Identify microwave oscillator and amplifier operating principles.

49.2. Tune or adjust microwave oscillators or amplifiers.

49.3. Isolate a faulty microwave oscillator or amplifier.

50. RESONANT CAVITIES.
TR: TOs 31-1-141-3, 31-1-141-9, 31-1-141-11

50.1. Identify resonant cavities operating principles.

50.2. Isolate a faulty resonant cavity circuits.

50.3. Tune and adjust a resonant cavity

51. TRANSMITTERS.
TR: TOs 31-1-141-4, 31-1-141-9, 31-1-141-13

51.1. Transmitters operating principles.

51.1.1. Identify amplitude modulation (AM) transmitter operating principles.

51.1.2. Identify frequency modulation (FM) transmitter operating principles.

51.1.3. Identify single sideband (SSB) transmitter operating principles.

51.1.4. Identify pulse modulation (PM) transmitter operating principles.

51.2. Faulty transmitter circuits.

51.2.1. Troubleshoot an AM transmitter.

51.2.2. Troubleshoot an FM transmitter.

51.2.3. Troubleshoot a SSB transmitter.

51.2.4. Troubleshoot a PM transmitter.

52. RECEIVERS.
TR: TOs 31-1-141-4, 31-1-141-9, 31-1-141-13

52.1. Receiver operating principles.

52.1.1. Identify AM receiver operating principles.

52.1.2. Identify FM receiver operating principles.

52.1.3. Identify SSB receiver operating principles.

52.1.4. Identify PM receiver operating principles.

52.2. Faulty receiver circuits.

52.2.1. Troubleshoot an AM receiver.

52.2.2. Troubleshoot an FM receiver.

52.2.3. Troubleshoot a SSB receiver.

52.2.4. Troubleshoot a PM receiver.

53. TRANSMISSION POWER.
TR: TOs 31-1-141-7, 31-1-141-8, 31-1-141-11

53.1. Perform transmission power measurements.

53.2. Calculate transmission power values.

54. ANTENNAS.
TR: TO 31-1-141-12

54.1. Identify antenna operating principles.

54.2. Perform antenna alignment.

54.3. Isolate a faulty antenna.

55. MICROPHONES.
TR: TO 31-1-141-3

55.1. Identify microphone operating principles.

55.2. Isolate a faulty microphone.

56. SPEAKERS.
TR: TO 31-1-141-3

56.1. Identify speaker operating principles.

56.2. Isolate a faulty speaker.

57. PHOTOSENSITIVE DEVICES.
TR: TOs 31-1-141-3, 31-1-141-4

57.1. Identify photosensitive devices operating principles. (③)

57.2. Isolate a faulty photosensitive devices.

58. DISPLAY TUBES.
TR: TO 31-1-141-3

58.1. Identify display tubes operating principles.

58.2. Isolate a faulty display tube.

59. SUPPORT SUBJECTS.
TR: TOs 31-1-141-1, 00-25-234

59.1. Identify and comply with safety applicable to electronics. (③)

59.2. Identify actions for first aid for electrical shock. (③)

59.3. Identify principles of electrostatic discharge (ESD) control to protect electronic components and circuits. (③)

59.4. Identify principles of protecting electronic components and circuits from effects of:

59.4.1. Electromagnetic pulse (EMP). (③)

59.4.2. Electromagnetic interference (EMI). (③)

59.4.3. Electromagnetic compatibility (EMC). (③)

PREFACE

NOTE 1: Unless otherwise stated in the objective, the student may be allowed two assists from the instructor and still successfully achieve the proper level of proficiency. An instructor assist is defined as anytime an instructor must intercede to provide guidance to a student which leads to a satisfactory completion of the objective or to prevent the student from continuing in a manner which will lead to an unsatisfactory conclusion, safety violation, or damage to equipment.

NOTE 2: All equipment related objectives are performed by following technical order or commercial manual procedures to include the correct selection and use of test equipment. Test equipment used throughout the course includes the following:

Handheld Telephone Test Set
Fluke Multimeters, Models: 27/FM (AN/PSM-45A) and 8024B
Navtel Handheld Analog Test Set (HATS) Model II
TTC Firebird MC6000 Communications Analyzer
AN/PSM 2A Megohmmeter Insulation Test Set
Tautron Northeast Model 7040 PCM Span - Repeater Test Set
Associated Research Model 259 Vibraground
Sage Instruments Model 930A Communications Test Set
Hekimian 3701-18 Communication Test Set

NOTE 3: All equipment related tasks in this training standard are accomplished utilizing the following equipment as training vehicles:

Telephones (Substation and Key)
1A2 Key Telephone Units (400, 415, 416, 418 and 461)
1A2 Key Service Panels (584 and 597)
Solid State Intercom (Single and Multi-Talk Link)
Electronic Key Systems (ITT 3100 and TIE Businesscom Plus)
Digital Switch (DMS-100, MSL-100) and associated peripheral equipment

NOTE 4: All objectives are trained during wartime.

NOTE 5: All references to Northern Telecom Practices (NTPs) are for Batch Change Supplements (BCS) 33.

1. AIR FORCE OCCUPATIONAL AND SAFETY (AFOSH) PROGRAM.
TR: AFI 91 series; AFOSH 91 series

1.1. Know safety and health hazards as they apply to AFSC 2E6X3.

1.2. Understand the AFOSH standards as they apply to AFSC 2E6X3.

1.3. Use safety practices when working with live circuits.

1.4. Use safety practices when using specialized hand tools.

1.5. Use safety practices when using test equipment.

1.6. Use safety practices when using ladders.

2. TELEPHONE SYSTEM FUNDAMENTALS.
TR: TOs 31W-3-6, 31W2-4-330 series

2.1. Know how sound principles are used in telephone systems.

2.2. Understand telephone transmitter and receiver principles.

2.3. Cite general principles of telephone systems.

3. COMMUNICATION-COMPUTER RECORDS - WIRE COMMUNICATIONS SYSTEMS.
TR: TO 00-20-8

3.1. Understand and use cable records.

3.2. Know the correct form entries on the cable transfer worksheet.

3.3. Understand and use circuit layout records.

3.4. Understand and use Monthly Storage Battery Records (AFTO Form 226).

3.5. Understand and use telephone equipment line records.

3.6. Interpret local communication service orders.

3.7. Understand the C4 systems requirement process.

4. SUB-STATION INSTALLATION.
TR: TOs 31W-3-6, 31W-1-102, 31W2 series, 31W3-10-20

4.1. Install/terminate inside cable using a wire wrap tool.

4.2. Install/terminate inside cable using an impact tool.

4.3. Install an amphenol connector on a cable.

4.4. Install a single line telephone.

4.5. Install miscellaneous premise equipment such as external bells and connecting blocks.

4.6. Install cross-connects for premise wiring.

4.7. Install protective grounding devices.

4.8. Perform operational test on telephones.

4.9. Perform corrective maintenance on a sub-station installation.

4.10. Know the procedures for installing Category 5 cable.

5. 1A2 KEY TELEPHONE SYSTEM INSTALLATION AND MAINTENANCE.
TR: TOs 31W1-1-271, 31W2 series

5.1. Know the principles of system operations.

5.2. Know the capabilities of 400 series key telephone units (KTU).

5.3. Know the capabilities of the 584C key service panel (KSP).

5.4. Know the capabilities of the 597 key service panel (KSP).

5.5. Know the capabilities of the 20-series power supplies.

5.6. Know the capabilities of the 30-series power supplies.

5.7. Understand and use the key system record worksheet.

5.8. Install a 1A2 key telephone system (584C and 597 key service panels).

5.9. Install single/multiple line series telephones.

5.10. Perform an operational test.

5.11. Perform corrective maintenance.

6. SOLID STATE TELEPHONE INTERCOM SYSTEMS.
TR: TO 31W2-4-330-2-2 and applicable technical publications

6.1. Know equipment operation and capabilities of a single talk link system (RT 1900).

6.2. Know equipment operation and capabilities of a multi-talk link system (ML 8000).

7. STATION PROGRAMMABLE ELECTRONIC KEY TELEPHONE SYSTEM (TIE BUSINESSCOM PLUS).
TR: Applicable technical publications

7.1. Know the principles of system operations.

7.2. Know the system capabilities.

8. KEYBOARD PROGRAMMABLE PABX/ELECTRONIC KEY TELEPHONE SYSTEM (ITT 3100).
TR: Applicable technical publications

8.1. Know the principles of system operations.

8.2. Know the system capabilities.

8.3. Know how to use the installation plan.

8.4. Install and/or program.

8.5. Perform an operational test.

8.6. Perform corrective maintenance.

9. FIBER OPTICS.
TR: TO 31-10-34; NTP 321-3201-100

9.1. Know the theory of light wave communications.

9.2. Know the application of connectors within the fiber optic system.

9.3. Know the operating principles of the NTI FMT-150A multiplex/demultiplex.

10. WIRE TRANSMISSION PRINCIPLES.
TR: TO 31-3-6, 33A1-12-310-1, 33A1-4-4-11, 33A1-3-533-1; commercial manuals

10.1. Explain the theory of wire transmission principles.

10.1.1. Know how to test station ground resistance using the Vibraground test set.

10.1.2. Know how to test insulation resistance using the Megohmmeter.

10.2. Perform:

10.2.1. DC loop resistance test using a multimeter.

10.2.2. Frequency response test using the HATS-II, Sage, Firebird, or equivalent equipment.

10.2.3. Idle channel noise test using HATS-II, Sage, Firebird, or equivalent equipment.

10.2.4. Impulse noise test using the HATS-II, Sage, Firebird, or equivalent equipment.

10.2.5. Bit Error Rate Test (BERT) using the Firebird.

11. NORTHERN TELECOM INCORPORATED (NTI) DIGITAL SWITCHING SYSTEMS.
TR: Northern Telecom Practices (NTP); applicable commercial manuals

11.1. Introduction to digital switching.

11.1.1. Associate components with the appropriate major area.

11.1.2. Understand the characteristics for conversion from analog-to-digital (A/D) and from digital-to-analog (D/A).

11.1.3. Understand the principles of time division multiplexing.

11.2. Locate desired information using NTPs and vendor manuals.

11.3. Principles of digital switching technology.

11.3.1. Know the characteristics of the Peripheral Module (PM) area.

11.3.2. Know the characteristics of the Network (NET) area.

11.3.3. Know the characteristics of the NT40 Central Control Complex (CCC) area.

11.3.4. Know the characteristics of the SuperNode.

11.3.5. Know the characteristics of the maintenance and administration area.

11.3.6. Know the operation of switch related power equipment.

11.3.7. Know the characteristics of the Office Alarm Unit (OAU).

11.3.8. Know the characteristics of the NTI DE-4 channel bank.

11.3.9. Know the characteristics of T-Span equipment.

11.3.10. Know the characteristics of modems.

11.3.11. Know the characteristics of a disk drive unit (DDU).

11.3.12. Know the characteristics of the magnetic tape transport.

11.3.13. Operate the E-MAP terminal.

11.3.14. Operate the Digital Equipment Corporation model LA120 DEC Writer III printer.

11.3.15. Store and retrieve data using the disk drive unit.

11.3.16. Store and retrieve data using the magnetic tape drive.

12. DIGITAL SWITCHING SYSTEM PREVENTATIVE MAINTENANCE.
TR: Northern Telcom Practices (NTP); commercial manuals, SL-OJT handbook; TO 31W2-4-1-346WC-1

12.1. Know the procedure to take an office image from the NT40 front end.

12.2. Know the procedure to take an office image from the SuperNode front end.

12.3. Know the procedure for cleaning the magnetic tape drive.

12.4. Know the procedure for cleaning the cooling unit.

12.5. Know the preventive maintenance requirements and procedures for the OAU.

12.6. Perform preventive maintenance procedures on the power converters.

12.7. Perform preventive maintenance procedures on the DC-to-AC inverter.

12.8. Know preventive maintenance requirements and procedures for batteries.

12.9. Know preventive maintenance procedures for distribution frames.

13. DIAGNOSE AND CORRECT DIGITAL SWITCHING SYSTEM FAULTS.
TR: Northern Telecom Practices (NTP)

13.1. Diagnose and correct faults in single unit Peripheral Modules.

13.2. Diagnose and correct faults in dual unit Peripheral Modules.

13.3. Diagnose line faults using the automatic line testing (ALT) feature.

13.4. Correct line faults using manual line testing procedures.

13.5. Diagnose and correct faults in the attendant console.

13.6. Diagnose trunk faults using the automatic trunk testing (ATT) feature.

13.7. Correct trunk faults using manual trunk testing procedures.

13.8. Diagnose and correct faults in the network module to include links, junctors, cross points, and the network module controller (NMC).

13.9. Diagnose and correct faults in the NT40 CCC to include the central processing unit (CPU), central message controller (CMC), data store (DS), and program store (PS).

13.10. Diagnose and correct faults in the SuperNode to include the computing module (CM), message switch (MS), and system load module (SLM).

13.11. Diagnose and correct faults in the IOD subsystem to include input/output controllers (IOC), device controllers (DC), and device independent recording package (DIRP).

13.12. Diagnose and correct faults on modems.

13.13. Diagnose and correct faults on a Channel Service Unit (CSU) and Digital Service Cross-connect (DSX) using the Firebird or equivalent equipment.

13.14. Diagnose and correct faults on a DE-4 channel bank using the Sage, Hekimian, or equivalent equipment.

13.15. Identify the purpose/function of data base facilities.

13.16. Identify the structure of translation data tables.

13.17. Initiate service order for Integrated Business Network (IBN) and Business sets to include Multiple Appearance Directory Numbers (MADN).

13.18. Interpret and list the procedures required for the routing of log utilities (LOGUTIL) reports.

13.19. Know the purpose and how to generate an Operational Measurement (OM) report.

14. RED SWITCH.
TR: Applicable commercial publications

14.1. Know the major components of a Red Switch to include IDNX.

14.2. Understand the Red Switch distribution system.

14.3. Identify types of Red Switch instruments and consoles.

15. TACTICAL COMMUNICATIONS.
TR: Army TC 24-20

15.1. Know and understand the tactical communication environment.

15.2. Know and understand a tactical distribution system.

15.3. Identify different types of tactical telephones.

15.4. Know and understand tactical switching systems.

16. SWITCH SECURITY.
TR: AFI 33-111

16.1. Understand basic switch security and access control.

16.2. Understand threats and vulnerabilities.

16.3. Understand security policy.

BEHAVIORAL FORMAT CTG CODING SYSTEM

Each CTG element is written as a behavioral statement. The details of the statement and verb selection reflects the level of training provided.

Code	Definition
K	Subject Knowledge Training - The verb selection identifies the individual's ability to identify facts, state principles, analyze, or evaluate the subject.
P	Performance Training - Identifies the individual performed the task to the satisfaction of the course; however he/she may not be capable of meeting the field requirements for speed and accuracy.
pk	Performance Knowledge Training - The verb selection identifies the individual's ability to relate simple facts, procedures, operating principles, and operational theory for the task.
-	When this code is used in the OJT Upgrade Column it indicates that the certification or qualification on this task is a local determination. When this code is used in the CDC Column it indicates that no training for this subject area is provided in the CDCs.
X	When this code is used in the OJT Upgrade Column it indicates that the individual must be trained and certified on this task before they can be upgraded to the appropriate skill level. This code indicates that training to satisfy this requirement is either provided through OJT, CDCs, or a combination of OJT and CDCs.
X*	When this code is used in the OJT Upgrade Column it indicates that the individual must be trained and certified on this task before they can be upgraded to the appropriate skill level if the individuals assigned duty position is responsible to maintain the equipment or system indicated as assigned by the local work center supervisor. This code indicates that training to satisfy this requirement is normally provided through OJT.

The identification blocks listed below are to be used when the trainer is other than the trainee's immediate supervisor.

THIS BLOCK IS FOR IDENTIFICATION PURPOSES ONLY		
NAME OF TRAINEE		
PRINTED NAME *(Last, First, Middle Initial)*	INITIALS *(Written)*	SSAN
PRINTED NAME OF CERTIFYING OFFICIAL AND WRITTEN INITIALS		
N/I	N/I	
N/I	N/I	
N/I	N/I	

PREFACE

NOTE 1: Users are responsible for annotating technical references to identify current references pending CTG revision.

NOTE 2: AFJQS 2EXXX-200B, C-E Enlisted Specialty Training is mandatory for use in conjunction with this STS. It sets the Air Force standard for qualification and certification for the following subject areas:

Career Progression Information
Information Security (INFOSEC)
Communications Security (COMSEC)
Protect MAJCOM/FOA Critical Mission Information
Physical Security
Electronic Emission Security (TEMPEST)
Electronic Warfare
AF Occupational Safety and Health Program (AFOSH)
Training
Work Center Administration
Operator Care of Assigned Government Vehicles
Supply
Technical Orders (TO) and Technical Publications
Supervision
C-E Equipment Maintenance Management
C-E Equipment Maintenance System Inspecting, Reporting, and Forms

NOTE 3: Equipment/system knowledge and/or performance tasks are defined in the AFJQS. Training is mandatory for use in conjunction with this CTG. AFJQS items set the standard for qualification and certification for these items. ***AFTQPs listed in the CTG do not have task listings, therefore tracking through CAMS is not possible. Annotate completion of these products on AF Form 623A.

NOTE 4: Refer to the Air Force Education and Training Course Announcements (ETCA) database, formally AFCAT 36-2223, USAF Formal Schools Catalog, for information on all formal schools identified in this CTG: http://hq2af.keesler.af.mil/etca.htm.

NOTE 5: When an AFJQS is loaded into CAMS, letters in the AFJQS identifier are converted to the number representing that letter's alphabetical position (e.g., 200B would be loaded as 200.2). To save space, individual AFJQS tasks are not normally listed within the CTG. However, if a CTG task is closely related to an AFJQS task or area, the AFJQS task/heading is listed (e.g., 200.2.12) and the related CTG task is listed under it (e.g., 200.2.12.75). To prevent potential task numbering conflicts between AFJQS tasks and subordinate CTG tasks, subordinate CTG tasks start with the number 75. This creates gaps in the final task numbering sequence, but integrates related CTG and AFJQS tasks so they will be listed on your training documents in the same area and in order.

NOTE 6: Refer to the following Army website to access Army TC 24-20: http://www.adtdl.army.mil/atdls.htm. Registration on this website is required prior to accessing publication.

TASKS, KNOWLEDGE AND TECHNICAL REFERENCES	5-LEVEL		OJT CERTIFICATION				
	OJT Upgrade	CDC	Start Date	Stop Date	Trainee Initials	Trainer Initials	Certifier Initials
1. TEST EQUIPMENT. TR: Applicable technical publications							
1.1. Explain the function of test equipment.	X	K					
1.2. Explain the applications of test equipment.	X	K					
1.3. Perform equipment maintenance using the following test equipment/devices:							
1.3.1. Multimeter.	X*	pk					
1.3.2. Handheld telephone test set.	X*	pk					
1.3.3. Telephone tone generator.	X*	pk					
1.3.4. Inductive amplifier.	X*	pk					
1.3.5. Telephone test board.	-	-					
1.3.6. Frequency selective voltmeter.	-	-					
1.3.7. Frequency counter.	-	-					
1.3.8. Telephone test oscillator.	-	-					
1.3.9. Noise measurement test set.	-	-					
1.3.10. Impulse noise test set.	-	-					
1.3.11. Transmission impairment measurement set.	-	pk					
1.3.12. Bit error rate test set.	-	pk					
1.3.13. T-span and repeater test set.	-	pk					
1.3.14. PCM channel access test set.	-	-					
1.3.15. Oscilloscope.	-	-					
1.3.16. Fiber optic power meter/light source.	-	pk					
1.3.17. Megohmmeter.	-	-					
1.3.18. Station ground test set.	-	-					
2. GENERAL MAINTENANCE TASKS. TR: Applicable technical publications							
2.1. Locate elements such as circuit cards, module, row, column, component, pin, connector, or test point using alphanumeric designator.	X*	-					
2.2. Perform visual inspection of systems cabinets, cables, and equipment.	X*	-					
2.3. Replace minor electrical hardware such as lamps and fuses.	X*	-					
2.4. Solder and desolder electronic equipment components.	X*	-					
2.5. Perform high reliability soldering.	X*	-					

TASKS, KNOWLEDGE AND TECHNICAL REFERENCES	5-LEVEL		OJT CERTIFICATION				
	OJT Upgrade	CDC	Start Date	Stop Date	Trainee Initials	Trainer Initials	Certifier Initials
2.6. Maintain or issue consolidated tool kits (CTK).	X*	-					
3. PERFORM GENERAL MAINTENANCE. TR: Applicable technical publications							
3.1. Perform power-up and power-down procedures.	X*	-					
3.2. Interpret results of diagnostic programs.	X*	-					
3.3. Interpret results of operational programs.	X*	-					
3.4. Interpret block diagram for fault isolation.	X*	-					
3.5. Interpret logic diagram for fault isolation.	X*	-					
3.6. Interpret schematic diagram for fault isolation.	X*	-					
4. GROUNDING SYSTEMS, CABLES, AND WIRING. TR: TO 31-10-24							
4.1. Interpret wiring diagrams for unit data flow.	-	-					
4.2. Isolate malfunctions in cable assemblies.	-	-					
4.3. Remove or install equipment signal cables or wiring.	-	-					
4.4. Replace or reconnect unit wiring.	-	-					
4.5. Remove or install equipment grounds.	-	-					
4.6. Check quality of equipment grounds.	-	-					
4.7. Fabricate or modify cable installations (non fiber optic cables).	-	-					
5. TELECOMMUNICATION SYSTEMS RECORDS. TR: TO 00-20-8 and AFI 21-404							
5.1. Interpret base cable plant configuration.	X	K					
5.2. Telephone and wire communications records.							
5.2.1. Maintain cable records.	X*	pk					
5.2.2. Use cable transfer worksheets.	-	pk					
5.2.3. Maintain circuit layout record/trouble reports.	X*	pk					
5.2.4. Maintain line record cards.	X*	pk					
5.2.5. Process work order requests.	X*	pk					
5.2.6. Maintain storage battery records.	-	pk					
6. SPECIALIZED TOOLS. TR: Applicable technical publications							
6.1. Use impact tool.	X*	pk					
6.2. Use scotch-lock tool.	X*	pk					

TASKS, KNOWLEDGE AND TECHNICAL REFERENCES	5-LEVEL		OJT CERTIFICATION				
	OJT Upgrade	CDC	Start Date	Stop Date	Trainee Initials	Trainer Initials	Certifier Initials
6.3. Use amphenol tool.	X*	pk					
7. TELEPHONE SYSTEM FUNDAMENTALS. TR: TO 31W-3-6 and 31W2-4-330							
7.1. Know the principles of sound, transmitters and receivers as used in telephone systems.	X	K					
7.2. Know the principles of telephone systems.	X	K					
8. SUBSTATION INSTALLATION AND MAINTENANCE. TR: TOs 31-10-7, 31-10-11, 31-10-13, 31W-3-6, 31W-1-102, 31W2-4-330 series, 31W3-10-20 Supplemental Course: J3AZR2E653 003, Telephone Installer. (See Note 4).							
8.1. Install cable.	X*	pk					
8.2. Secure cable.	-	pk					
8.3. Fan cable.	-	pk					
8.4. Form cable.	-	pk					
8.5. Terminate cable using:							
8.5.1. Wire wrap method.	X*	pk					
8.5.2. Punch-on method.	X*	pk					
8.5.3. Amphenol method.	X*	pk					
8.6. Install cross-connects on distribution frames.	X*	pk					
8.7. Terminate strapping connections using solderless connectors.	-	pk					
8.8. Install single line telephones.	X*	pk					
8.9. Install miscellaneous premise equipment.	-	pk					
8.10. Install cross-connects for premise wiring.	X*	pk					
8.11. Install protective grounding devices.	-	pk					
8.12. Perform substation operation test.	X*	pk					
8.13. Perform substation corrective maintenance.	-	pk					
9. SOLID STATE TELEPHONE INTERCOM SYSTEMS. TR: Applicable technical publications Supplemental Course: J3AZR2E653 003, Telephone Installer. (See Note 4)							
9.1. RT-1900 Single Talk Link system.							
9.1.1. Know the principles of system operation.	-	K					
9.1.2. Know the system capabilities.	-	K					

TASKS, KNOWLEDGE AND TECHNICAL REFERENCES	5-LEVEL		OJT CERTIFICATION				
	OJT Upgrade	CDC	Start Date	Stop Date	Trainee Initials	Trainer Initials	Certifier Initials
9.1.3. Install system.	-	pk					
9.1.4. Perform system operational test.	-	pk					
9.1.5. Perform system corrective maintenance.	-	pk					
10. WIRE TRANSMISSION PRINCIPLES. TR: TOs 31W-3-5, 31W-3-6, 31W3-10-15, and applicable technical publications							
10.1. Identify the principles of wire transmission.	X	K					
10.2. Perform and interpret the following cable plant transmission tests:							
10.2.1. DC loop resistance.	-	pk					
10.2.2. Frequency response.	-	pk					
10.2.3. Idle channel noise.	-	pk					
10.2.4. Impulse noise.	-	pk					
10.2.5. Bit error rate.	-	pk					
10.2.6. Insulation resistance.	-	pk					
10.2.7. Station ground resistance.	-	pk					
11. FIBER OPTICS. TR: TO 31-10-34 and applicable technical publications. Supplemental Course: J3AZR2E652 007, Fiber Optic Cable Installation, Splicing, and Maintenance. (See Note 4)							
11.1. Know the principles of light wave communications.	-	K					
11.2. Know the principles of fiber optic modem operation.	-	K					
11.3. Know the principles of fiber optic multiplexer operation.	-	K					
11.4. Know the types and applications of fiber optic connectors.	-	K					
11.5. Know the principles of single mode fiber optic cable.	-	K					
11.6. Know the principles of multimode fiber optic cable.	-	K					
11.7. Test fiber optic cable using fiber optic power meters/light sources.	-	pk					
11.8. Troubleshoot fiber optic modems.	-	pk					
11.9. Troubleshoot fiber optic multiplexers.	-	pk					
12. NORTHERN TELECOM DIGITAL MULTIPLEX SYSTEM (DMS) DIGITAL SWITCHING SYSTEMS. TR: Applicable technical publications Supplemental Course: J3AZR2E653 004, Digital Switching (NORTEL) and AFJQS 2E6X3-208R. (See Note 4)							

TASKS, KNOWLEDGE AND TECHNICAL REFERENCES	5-LEVEL		OJT CERTIFICATION				
	OJT Upgrade	CDC	Start Date	Stop Date	Trainee Initials	Trainer Initials	Certifier Initials
12.1. Introduction to digital switching systems.							
12.1.1. Know the major components of digital switching systems.	X	K					
12.1.2. Know the principles of analog to digital/digital to analog conversion.	X	K					
12.1.3. Know the principles of time division multiplexing.	X	K					
12.2. Locate required information in applicable Northern Telecom documentation.	X*	pk					
12.3. Principles of digital switching technology.							
12.3.1. Know the functions and characteristics of the peripheral area.	X	K					
12.3.2. Know the functions and characteristics of the network area.	X	K					
12.3.3. Know the functions and characteristics of the central control area for:							
12.3.3.1. NT40 processor.	X	K					
12.3.3.2. SuperNode processor.	X	K					
12.3.4. Know the functions and characteristics of the maintenance and administration area.	X	K					
12.3.5. Know the functions and characteristics of the following ancillary equipment:							
12.3.5.1. Power equipment.	X	K					
12.3.5.2. Office alarm unit (OAU).	X	K					
12.3.5.3. DE-3/DE-4 Channel Banks.							
12.3.5.4. Modems.	X	K					
12.3.5.5. Disk drives.	X	K					
12.3.5.6. Magnetic tape drives.	X	K					
12.3.5.7. External conferencing systems.	X	K					
12.3.5.8. Land mobile radio interface equipment.	-	K					
12.3.5.9. Channel service unit (CSU).	X	K					
12.4. Digital Switching System Operations.							
12.4.1. Operate maintenance and administration position.	X*	K					
12.4.2. Store and retrieve data using the disk drive unit.	X*	pk					
12.4.3. Store and retrieve data using the magnetic tape drive unit.	X*	pk					
12.5. Database Administration.							

TASKS, KNOWLEDGE AND TECHNICAL REFERENCES	5-LEVEL		OJT CERTIFICATION				
	OJT Upgrade	CDC	Start Date	Stop Date	Trainee Initials	Trainer Initials	Certifier Initials
12.5.1. Know the functions and characteristics of database facilities.	X	K					
12.5.2. Service Orders (SERVORD).							
12.5.2.1. Know the functions and characteristics of SERVORD.	X	K					
12.5.2.2. Initiate SERVORD for Integrated Business Network (IBN) and business sets.	X*	pk					
12.5.3. Data Tables.							
12.5.3.1. Know the functions and characteristics of data tables.	X	K					
12.5.3.2. Perform modifications to data tables.	X*	pk					
12.5.3.3. Perform translation verifications (TRAVERS).	X*	pk					
12.5.4. Log Utilities (LOGUTIL).							
12.5.4.1. Identify the functions and characteristics of LOGUTIL reports.	X	K					
12.5.4.2. Route and interpret LOGUTIL reports.	X*	pk					
12.5.5. Operational Measurements (OM).							
12.5.5.1. Know the functions and characteristics of OMs.	X	K					
12.5.5.2. Generate and interpret OM reports.	X*	pk					
12.6. Perform preventive maintenance on the following equipment:							
12.6.1. NT40 processor.	X*	pk					
12.6.2. SuperNode processor.	X*	pk					
12.6.3. Magnetic tape drives.	X*	pk					
12.6.4. OAU.	X*	pk					
12.6.5. Cooling units.	X*	pk					
12.6.6. Batteries.	X*	pk					
12.6.7. Distribution frames.	X*	-					
12.7. Diagnose and correct troubles in:							
12.7.1. Peripheral area.							
12.7.1.1. Single unit peripheral modules.							
12.7.1.1.1. Line Module (LM)/Remote Line Module (RLM).	-	pk					
12.7.1.1.2. Trunk Module (TM)/Maintenance Trunk Module (MTM)/Service Trunk Module (STM).	-	pk					
12.7.1.1.3. Digital Communications Module (DCM).	-	pk					
12.7.1.2. Dual unit peripheral modules.							

TASKS, KNOWLEDGE AND TECHNICAL REFERENCES	5-LEVEL		OJT CERTIFICATION				
	OJT Upgrade	CDC	Start Date	Stop Date	Trainee Initials	Trainer Initials	Certifier Initials
12.7.1.2.1. Line Concentrating Module (LCM)/Remote Line Concentrating Module (RLCM)/Enhanced Line Concentrating Module (ELCM).	-	pk					
12.7.1.2.2. Digital Trunk Controller (DTC)/Line Group Controller (LGC)/Line Trunk Controller (LTC).	-	pk					
12.7.1.2.3. Remote Communications Controller (RCC).	-	pk					
12.7.2. Lines.							
12.7.2.1. Using automatic line testing procedures.	-	pk					
12.7.2.2. Using manual line testing procedures.	-	pk					
12.7.3. Attendants consoles.	-	pk					
12.7.4. Trunks.							
12.7.4.1. Using automatic trunk testing procedures.	-	pk					
12.7.4.2. Using manual line testing procedures.	-	pk					
12.7.5. Network area.							
12.7.5.1. Links.	-	pk					
12.7.5.2. Junctors.	-	pk					
12.7.5.3. Cross points.	-	pk					
12.7.5.4. Network module controller.	-	pk					
12.7.6. Central control area.							
12.7.6.1. NT40 processor.							
12.7.6.1.1. Central processing unit (CPU).	-	pk					
12.7.6.1.2. Central message controller (CMC).	-	pk					
12.7.6.1.3. Data store.	-	pk					
12.7.6.1.4. Program store.	-	pk					
12.7.6.2. SuperNode processor.							
12.7.6.2.1. Computing module.	-	pk					
12.7.6.2.2. Message switch.	-	pk					
12.7.6.2.3. System load module.	-	pk					
12.7.7. Input/output devices.							
12.7.7.1. Input/output controllers.	-	pk					
12.7.7.2. Device Controller.	-	pk					
12.7.7.3. Device Independent Recording Package (DIRP).	-	pk					
12.7.8. Ancillary equipment.							

TASKS, KNOWLEDGE AND TECHNICAL REFERENCES	5-LEVEL		OJT CERTIFICATION				
	OJT Upgrade	CDC	Start Date	Stop Date	Trainee Initials	Trainer Initials	Certifier Initials
12.7.8.1. Power system.	-	pk					
12.7.8.2. OAU.	-	pk					
12.7.8.3. DE-3/DE-4 Channel Banks.	-	pk					
12.7.8.4. Modems.	-	pk					
12.7.8.5. Disk drives.	-	pk					
12.7.8.6. Magnetic tape drives.	-	pk					
12.7.8.7. External conferencing systems.	-	pk					
12.7.8.8. Land mobile radio interface equipment.	-	pk					
12.7.8.9. CSU.	-	pk					
13. RED SWITCH. TR: Applicable commercial publications							
13.1. Know the major components of a Red Switch to include IDNX.	-	-					
13.2. Understand the Red Switch distribution system.	-	-					
13.3. Identify types of Red Switch instruments and consoles.	-	-					
14. TACTICAL COMMUNICATIONS. TR: Army TC 24-20 (See Note 6)							
14.1. Know and understand the tactical communications environment.	-	K					
14.2. Know and understand a tactical distribution system.	-	K					
14.3. Identify different types of tactical telephones.	-	K					
14.4. Know and understand tactical switching systems.	-	K					
15. SWITCH SECURITY. TR: AFSSI 5033 and AFQTP 2E6X3-207RD							
15.1. Understand basic switch security and access control.	-	K					
15.2. Understand threats and vulnerabilities.	-	K					
15.3. Understand security policies.	-	K					
16. INTRA-BUILDING WIRING DISTRIBUTION SYSTEMS. TR: EIA/TIA 568 A STANDARDS.							
16.1. Know principles of intra-building wiring distribution system.	X	K					
16.2. Know category-five installation principles and associated hardware.	-	-					
16.3. Know how to route, form, and terminate category-five cable.	-	-					

TASKS, KNOWLEDGE AND TECHNICAL REFERENCES	5-LEVEL		OJT CERTIFICATION				
	OJT Upgrade	CDC	Start Date	Stop Date	Trainee Initials	Trainer Initials	Certifier Initials
16.4. Know how to install racks, patch panels, and wire management systems.	-	-					
16.5. Know how to label, test, and certify category-five cable.	-	-					
200. AIR FORCE JOB QUALIFICATION STANDARDS APPLICABLE TO AFSC 2E6X3. TR: AFI 21-116; AFI 36-2233; CFETP 2E6X3							
200.2. AFJQS 2EXXX-200B, C-E Enlisted Specialty Training. (See Notes 2 and 3)	X	-					
200.2.8. AIR FORCE OCCUPATIONAL SAFETY AND HEALTH (AFOSH) PROGRAM. TR: AFI 91-301, Applicable AFOSH standards							
200.2.8.75. Identify hazards of AFSC 2E6X3.	X	K					
200.2.8.76. Use safety practices when working with:							
200.2.8.76.1. Live circuits.	X	pk					
200.2.8.76.2. Specialized tools.	X	pk					
200.2.13. TECHNICAL ORDERS AND AIR FORCE PUBLICATIONS. TR: AFR 8-2; TOs 0-1-01, 0-1-02, 00-5-1, 00-5-2, 31W2 series							
200.2.13.75. Describe the technical order system.	X	-					
200.2.13.76. Locate required maintenance information in applicable technical orders and manuals.	X	-					
200.2.13.77. Use technical publications when performing:							
200.2.13.77.1. Maintenance tasks.	X	K					
200.2.13.77.2. Inspection tasks.	X	K					
200.2.16. Communications Computer Systems Installation Records (CSIRs).							
200.2.16.75. Use CSIRs.	X*	pk					
200.2.16.76. Update CSIRs.	-	pk					
200.2.16.77. Engineering/installation drawings.							
200.2.16.77.1. Use engineering drawings.	X*	pk					
200.2.16.77.2. Update engineering/installation drawings.	-	pk					
200.13. AFQTP 2EXXX-200M, Mobility Readiness Program. (See Note 3)	X*	-					
201.3. AFJQS 2EXXX-201C, Corrosion Prevention and Control. (See Note 3)	X*	-					

TASKS, KNOWLEDGE AND TECHNICAL REFERENCES	5-LEVEL		OJT CERTIFICATION				
	OJT Upgrade	CDC	Start Date	Stop Date	Trainee Initials	Trainer Initials	Certifier Initials
201.5. AFJQS 2EXXX-201E, Ground C-E Core Automated Maintenance Systems (CAMS). (See Note 3)	X*	-					
201.7. AFJQS 2EXXX-201G, Maintenance Support. (See Note 3)	X*	-					
201.8. AFJQS 2EXXX-201H, Work Center Deficiency Reporting System. (See Note 3)	X*	-					
201.10. AFJQS 2EXXX-201J, Maintenance Training Program. (See Note 3)	X*	-					
201.12. AFQTP 2EXXX-201L, C-E Work Center Managers Handbook. (See Note 3)	X*	-					
201.16. AFJQS 2EXXX-201P, Work Center Test Equipment Management. (See Note 3)	X*	-					
201.24. AFJQS 2EXXX-201X, E&I Quality Assurance. (See Note 3)	X*	-					
202.1. AFQTP 2EXXX-202A, Electrostatic Discharge (ESD) Familiarization Handbook. (See Note 3)	X*	-					
202.2. AFJQS 2EXXX-202B, SIPT Electronics and Inside Plant (E&I). (See Note 3)	X*	-					
207.18.1. AFJQS 2E6X3-207RA, DMS/MSL 100/200 Digital Switch Translations. (See Note 3)	X*	-					
207.18.3. AFJQS 2E6X3-207RC, DMS/MSL 100/200 Traffic Analysis. (See Note 3)	X*	-					
20 7.18.4. AFQTP 2E6X3-207RD, DMS/MSL 100/200 Digital Switch Security Procedures Handbook. (See Note 3)	X*	-					
208.18. AFJQS 2E6X3-208R, DMS/MSL 100/200 Telephone Switching System. (See Note 3)	X*	-					
208.23. AFJQS 2E6X3-208W, T1 Carrier System (Terminal End Equipment). (See Note 3)	X*	-					
208.23.75. AFJQS 2E6X3-208W, T1 Span Equipment and Line Performance Test.	X*	-					
210.24. AFJQS 2E6X3-210X, DE3/DE4 Channel Bank Maintenance. (See Note 3)	X*	-					
210.25. AFJQS 2E6X3-210Y, Siemens KNS-4100 Electronic Telephone System. (See Notes 3 and 4) Supplemental Course: J3AZR2E653 005, Digital Switching (KNS-4100).	X*	-					
211.6. AFJQS 2E6X3-211F, 1A2 Key Telephone Systems. (See Notes 3 and 4.) Supplemental Course: J3AZR2E653 003, Telephone Installer.	X*	-					

TASKS, KNOWLEDGE AND TECHNICAL REFERENCES	5-LEVEL		OJT CERTIFICATION				
	OJT Upgrade	CDC	Start Date	Stop Date	Trainee Initials	Trainer Initials	Certifier Initials
211.6.75. Know the principles of system operation.	-	K					
211.6.76. Know the system capabilities of the:							
211.6.76.1. Key Telephone Unit (KTU).	-	K					
211.6.76.2. Key Service Unit (KSU).	-	K					
211.6.76.3. Panel.	-	K					
211.6.76.4. Power Supply.	-	K					
211.6.77. Plan system installation.	-	K					
211.10.2. AFJQS 2E6X3-211JB, Electronic Key Systems. (See Notes 3 and 4) Supplemental Course: J3AZR2E653 003, Telephone Installer.	X*	-					
211.10.2.75. Know the principles of system operation.	-	K					
211.10.2.76. Know the system capabilities.	-	K					
211.12. AFJQS 2E6X3-211L, Telephone Surveys (Government-Owned Plants). (See Note 3)	X*	-					
212.8. AFJQS 2E6X3-212H, Commercial Communications Management. (See Note 3)	X*	-					

Section B - Course Objective List

4. This section not used.

Section C - Support Materials

5. This section not used.

Section D - Training Course Index

6. Refer to the Air Force Education and Training Course Announcements (ETCA) database, formally AFCAT 36-2223, USAF Formal Schools Catalog, for information on all formal schools identified in this CTG: http://hq2af.keesler.af.mil/etca.htm.

6.1. **Air Force In-Residence Courses**

Course Number	Course Title	Location
J3AZR2E653 003	Telephone Installer	Sheppard
J3AZR2E653 004	Digital Switching System Technician (NORTEL)	Sheppard
J3AZR2E653 005	Digital Switching System Technician (KNS-4100)	Sheppard
J3AZR2E652 007	Fiber Optic Cable Installation, Splicing, and Maintenance	Sheppard

6.2. **Air Force Job Qualification Standards and Air Force Qualification Training Packages**

6.2.1. Refer to AFIND8, Numerical Index of Specialty Education/Training Publications for the list of published AFJQS/AFQTPs and how to order these publications. Refer to AFI 36-2233, Air Force On-The-Job Training Products for Communications-Electronics Enlisted Specialty Training for information on all Air Force Job Qualification Standards/Air Force Qualification Training Packages.

6.2.2. AFJQS/AFQTPs applicable to AFSC 2E6X3:

Publication No.	**Pseudo Code**	**Publication Title**
AFJQS 2E6X3-207RA	2E6X3-207.18.1	DMS 100/200 Digital Switch Translations
AFJQS 2E6X3-207RC	2E6X3-207.18.3	DMS/MSL 100/200 Traffic Analysis
AFQTP 2E6X3-207RD	2E6X3-207.18.4	DMS/MSL 100/200 Digital Switch Security Procedures Handbook
AFJQS 2E6X3-208R	2E6X3-208.18	DMS/MSL 100/200 Telephone Switching System
AFJQS 2E6X3-208W	2E6X3-208.23	T1 Carrier System (Terminal End Equipment)
AFJQS 2E6X3-210X	2E6X3-210.24	DE3/DE4 Channel Bank Maintenance
AFJQS 2E6X3-210Y	2E6X3-210.25	Siemens KNS 4100 Electronic Telephone System
AFJQS 2E6X3-211F	2E6X3-211.6	1A2 Key Telephone Systems
AFJQS 2E6X3-211H	2E6X3-211.8	ML8000 Multi Link Intercom System
AFJQS 2E6X3-211JB	2E6X3-211.10.2	Electronic Key Systems
AFJQS 2E6X3-211L	2E6X3-211.12	Telephone Surveys (Government-Owned Plants)
AFJQS 2E6X3-212H	2E6X3-212.8	Commercial Communications Management

6.2.3. Additional AFJQS/AFQTP/QTP maintenance management and generic training products applicable to this specialty are:

Publication No.	**Pseudo Code**	**Publication Title**
AFJQS 2EXXX-200B	2EXXX-200.2	2EXXX C-E Enlisted Specialty Training
AFQTP 2EXXX-200M	2EXXX-200.13	Mobility Readiness Program
AFJQS 2EXXX-201C	2EXXX-201.3	Corrosion Prevention and Control
AFJQS 2EXXX-201E	2EXXX-201.5	Ground C-E Core Automated Maintenance System (CAMS)
AFJQS 2EXXX-201G	2EXXX-201.7	Maintenance Support

Publication No.	Pseudo Code	Publication Title
AFJQS 2EXXX-201H	2EXXX-201.8	Work Center Deficiency Reporting System
AFJQS 2EXXX-201J	2EXXX-201.10	Maintenance Training Program
AFQTP 2EXXX-201L	2EXXX-201.12	Work Center Managers Handbook
AFQTP 2EXXX-201LB	2EXXX-201.12.2	Communications Electronic (C-E) Manager's Handbook
AFJQS 2EXXX-201P	2EXXX-201.16	Work Center Test Equipment Management
AFJQS 2EXXX-201X	2EXXX-201.24	E&I Quality Assurance
AFQTP 2EXXX-202A	2EXXX-202.1	Electrostatic Discharge (ESD) Familiarization Handbook
AFJQS 2EXXX-202B	2EXXX-202.2	SIPT Electronics and Inside Plant (E&I)
AFQTP 2EXXX-202D	2EXXX-202.4	EI TEMPEST Installation Handbook

6.3. **Air Force Engineering and Technical Services (AFETS) Training**.

6.3.1. See the current edition of the *Catalog of Communications-Electronics Air Force Engineering and Technical Services Courses* (Catalog is revised annually and is available through your MAJCOM's C-E MATAG Working Group representative). Telephone Systems equipment training is available from AFETS/CFS/SMT personnel through the listed MAJCOMs.

EQUIPMENT	MAJCOM		
	AFSPC	ACC	AETC
DMS-100/200/ Meridian SL-100			X
Fiber Optics			X
Red Switch		X	
Red Switch SDS-1/RSU-1	X		

6.4. **Standard Installation Practices Training.**

Lightning Force Orientation and Installation Practices Training (LFOIP)--Cable
POC: 738 EIS/ISUS
DSN: 597-2209

Fiber Optics Course
POC: 738 EIS/ISUS
DSN: 597-2209

Introduction to LAN Distribution Systems
POC: 738 EIS/ISUS
DSN: 597-2209

NOTE: LFOIP is primarily for E&I 2E6X1 and 2E6X2 technical requirements.

Section E - MAJCOM Unique Requirements

This section not used.